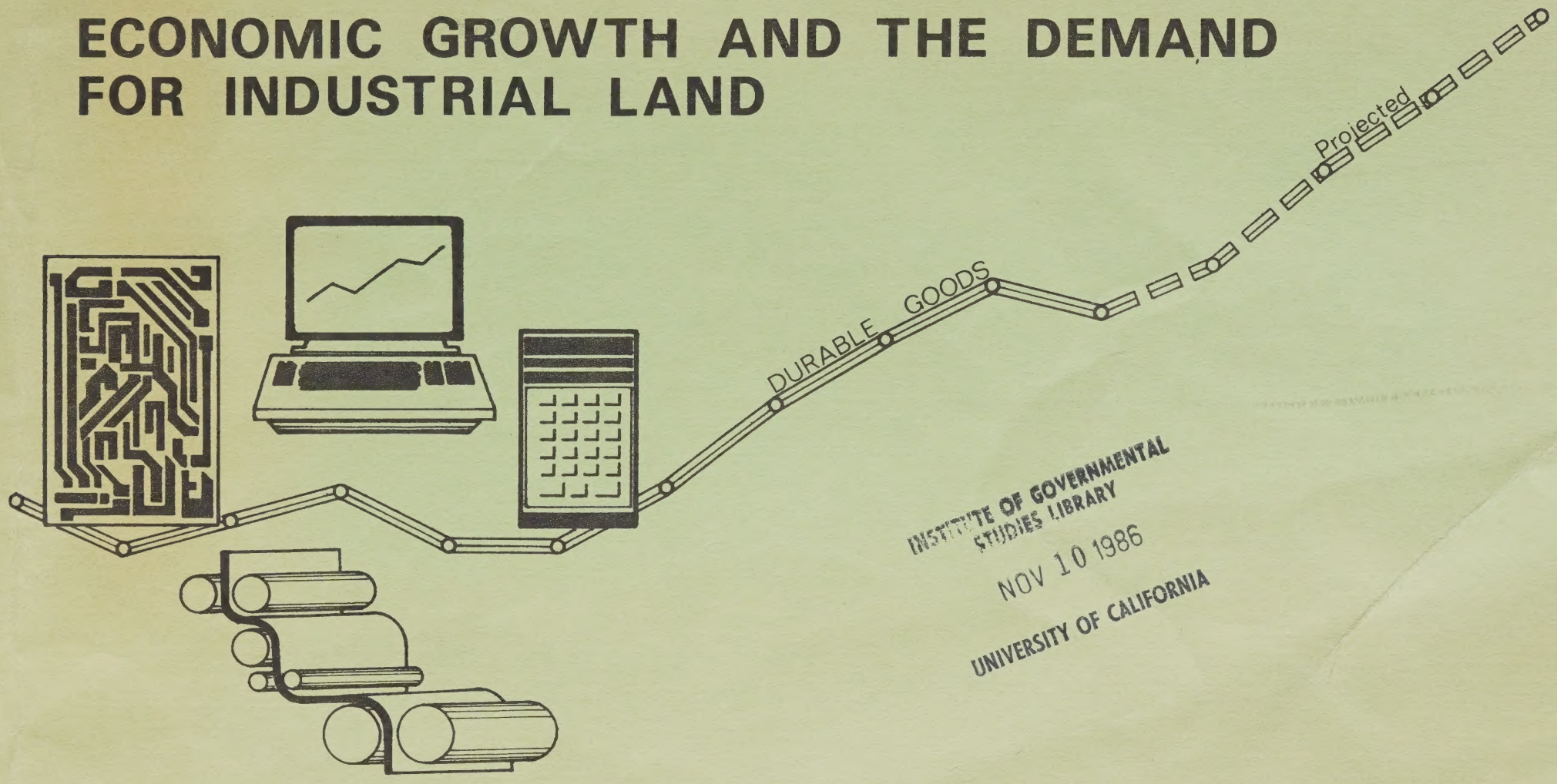
THE SACRAMENTO REGION IN 1990

ECONOMIC GROWTH AND THE DEMAND FOR INDUSTRIAL LAND



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ECONOMIC GROWTH AND THE DEMAND

FOR INDUSTRIAL LAND

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SUMMARY AND CONCLUSIONS

A. SACRAMENTO'S GROWTH IN THE 1970's

Wage and salary jobs in the Sacramento region increased by 136,000 during the 1970's. Of these jobs, 28,700 (21%) were in sectors conventionally considered to be basic activities. Basic job growth was led by the state and federal governments which added 23,000 workers to their payrolls. Manufacturing jobs increased by only 5000 during the decade.

The conventionally nonbasic or service sectors of the economy dominated growth during the 1970's, with 107,400 new jobs, 79% of the total. The fastest-growing sectors were retail trade; services; and finance, insurance and real estate. Together, they accounted for almost 60% of all new jobs in the region.

Several factors account for the dramatic increases in the nonbasic sectors of the economy. Substantial growth in real personal income (34%) and even larger gains in real taxable sales per capita (48%) during the decade meant that more money was available to purchase goods and services as the post war baby boom came of age, gained employment, and formed households. An estimated 27,000 workers also entered the labor force as second wage earners, and their increased time constraints for the sake of additional disposable income further helped increase the demand for goods and services. Other factors include new service industries associated with technological advances and the increasing variety of services a region can support as it gets bigger.

B. EMPLOYMENT PROJECTIONS FOR 1990

If the economic growth trends of the 1970's are extended into the 1980's, we can expect about 75,000 new jobs created in the Sacramento region between 1980 and 1985. If this rate of growth is compounded to 1990, in the vicinity of 165,000 new jobs will be created.

Gains in basic jobs are projected to amount to 29,400 during the 1980's, about the same as the previous decade. However, most of these new jobs will be in manufacturing, as opposed to state and federal government.

Whether or not the employment trends of the 1970's will continue through the 1980's is a key question. Factors which may exert a downward influence are demographic changes leading to a slowdown in job creation, levelling off of the labor force participation rate increase, housing costs, and the overall productivity of the national economy. Low- and high-trend projections of real per capita personal income growth of 9% and 24%, respectively, are both well under the increase registered during the 1970's.

These trends suggest that some delcine in the growth of retail trade, services, and FIRE sectors will occur, particularly after 1985. Total job growth in the Sacramento region is more likely to be between 140,000 and 150,000 over the next ten years.

C. HIGH TECHNOLOGY INDUSTRIES: A HIGH-TREND GROWTH PROJECTION

The possibility that high-technology manufacturing jobs will dramatically increase during the 1990's represents the major potential upward influence on the region's employment growth.

Nationally, high-technology industries are projected by economists for the Bureau of Census to increase employment by between 544,000 to 778,000 by 1990 (low- and high-trend projections).

The Center for the Continuing Study of California's Economy estimates that California can expect 113,000 new high-technology jobs during the 1980's, an estimate which appears to be based on low-trend national projections. According to this projection, California would capture only 26% of all new jobs in the nation, compared to 38% for the prior decade as high-technology firms increasingly choose locations outside of California when they expand.

The Center's high-tech growth projections for each of seven economic regions in California suggest that the increment of national high-technology growth that California does manage to attract will continue to be distributed among the state's regions in approximately the same manner as occurred during the 1970's, except that the Sacramento region will capture about 10% of the growth that would otherwise have occurred in the Bay Area. This represents a continuation of existing trends, after accounting for the announced decisions by several firms to locate in Sacramento.

Sacramento's attributes relevant to the locational criteria considered most important to high-technology companies make the region very competitive for potential new firms. Comparatively-low housing costs, reasonable industrial land costs, and inexpensive, reliable energy are among the region's key advantages.

A high-trend employment projection recently prepared by Angus McDonald & Associates for Sacramento City is based on the assumption that the Sacramento region's attributes will enable it to capture 34% of all new high-technology jobs in the state for a total growth of 25,700 high-tech jobs by 1990. Secondary growth resulting from these additional basic jobs would lead to 45,300 more jobs than the existing trend projection, for a total high-trend employment growth of 210,600.

D. EMPLOYMENT, POPULATION, AND HOUSEHOLD RELATIONSHIPS

Population projections based on alternative employment projections developed in this report were prepared using two alternative population/job ratios. These ratios reflect a slowing rate of labor force growth in the 1980's.

During the 1970's, many thousands of new jobs were filled by young workers entering the labor force for the first time, thus moderating population growth relative to new jobs. Projections of population age distribution show virtually no change in the percentage of persons over 16, as the number of persons reaching 16 years balances newborn and young immigrants. This means that inmigrations will increase as new jobs are filled from outside the region. For a given amount of jobs, we can expect a much larger population increase in the 1990's compared to what occurred in the previous decade.

Household size is projected to continue its decline, reaching a weighted average of 2.434 for the Sacramento region by 1990. High housing costs and demographic changes associated with a shift to a more manufacturing-based economy may, however, slow the rate of household size decline.

The population and households which would result from given levels of employment growth are summarized in the table below.

1990 POPULATION AND HOUSEHOLD PROJECTIONS
BASED ON ALTERNATIVE EMPLOYMENT GROWTH TRENDS
SACRAMENTO SMSA

EMPLOYMENT INCREASE (in 1000's)	BASIS OF PROJECTION	POPULATION INCREASE (in 1000's) (1)	HOUSEHOLD INCREASE (in 1000's) (2)
125	Center for Continuing Study of California's Economy	216 248	103 116
145	Existing Trends Adjusted to Reflect Slowdown in Service-Sector Growth (4)	262 295	121 135
165	Existing Trends	308 342	140 153
193	Adjusted Existing Trends Plus Rapid High-Tech Growth (3)	373 409	166 180
213	Existing Trends Plus Rapid High-Tech Growth (3)	419 456	184 199

(1) High projection based on population/jobs ratio of 2.365.
Low projections based on population/jobs ratio of 2.306.
1980 population = 1,014,000.

(2) Based on weighted average household size of 2.434 for Sacramento SMSA, 2.4% of population in group quarters, and 1980 occupied households of 390,400.

(3) Based on additional 25,700 high-technology jobs and 45,300 additional total high-trend projection developed by Angus McDonald Associates for Sacramento City.

(4) Corresponds to most recent State Department of Finance projection of 285,000 population increase for the region.

E. INDUSTRIAL LAND DEMAND AND SUPPLY

Currently, manufacturing activities use only 18% of the 5,300 acres of developed, occupied, industrially-zoned land in Sacramento's prime and good industrial areas. Wholesale trade, construction, transportation, office and other uses occupy the remainder of the land.

Manufacturing will play a much more significant role in the Sacramento region's employment growth during the 1980's. Employment projections suggest that new manufacturing jobs will represent from 12.8% (existing trend) to 22.5% (high growth trend) of all new jobs in the region during the 1980's compared to only 3.7% during the previous ten years. Even though there will be some growth among those sectors competing for industrial land, it appears that manufacturing will consume from one-quarter to one-third of all industrial land developed during the 1980's.

The intensity of manufacturing employment will increase because high-technology manufacturing locating in Sacramento is likely to continue at employment densities comparable to the 40 workers per acre experienced in the Santa Clara Valley and planned by high-tech firms which have located in Sacramento already. Other manufacturing uses are expected to continue to employ an average of 15 persons per acre. Overall employment density for all new manufacturing activities will range from 20 jobs per acre with the existing trend projection to almost 30 jobs per acre with the high-growth trend projection.

Existing trend employment projections suggest that growth in manufacturing will require about 530 acres out of some 2,120 acres of new industrial land likely to be occupied during the 1980's. The high-growth projection could result in manufacturing taking 920 acres of 2,800 acres required by all competing activities. These figures translate into annual industrial land absorption rates of about 250 acres and 350 acres.

The vacant zoned industrial land with available urban services in the Sacramento jurisdictions totals 7,800 acres. About 3,100 acres of this land has been rated as suitable for high-tech manufacturing use, including almost 2,000 acres with good to excellent potential. Ten development projects now being marketed with a slant toward high-tech tenants incorporate 1,130 acres of this best land. Assuming high-tech tenants occupy only one-third of the space in these projects at expected densities, the high-tech manufacturing job capacity of these projects alone is over 15,000 jobs. Forecasts of high-tech jobs locating in the Sacramento jurisdictions by 1990 range from 3,500 in the existing trend scenario to 18,200 in the high-growth trend scenario.

CONCLUSIONS

1. Manufacturing will replace government as the primary source of new basic jobs during the 1980's.

2. If existing employment trends continue, we can expect about 165,000 new jobs in the region by 1990.

3. However, a levelling off in service sector job growth rates will probably result in a gain of about 145,000 jobs by 1990, provided that basic job growth continues to parallel past trends.

4. If high-technology firms increasingly choose to locate in the Sacramento region, we might expect as many as 210,000 new jobs by 1990.

5. The population impact of job increases will be much more pronounced in the 1980's than it was during the 1970's.

6. Population growth associated with an employment gain of 145,000 will be between 262-295,000, corresponding approximately to the official population projection by the State Department of Finance.

7. Population growth associated with the high-trend growth projection will be between 419-456,000. This will require 44 square miles of residential development at an average density of 7 dwelling units/acre. The region does not have the service capacity to provide housing for this level of development.

8. For a variety of reasons, it is unlikely that the upper limits of these employment projection ranges will be attained.

9. Industrial park projects now being marketed in the Sacramento jurisdictions encompass enough land so that if a one-third share occupancy by high-tech manufacturing tenants is achieved, there is sufficient capacity for all of the high-tech job growth forecast by 1990 in the existing trend employment projection. Almost 85% of the high-tech job growth forecast by 1990 in the high-growth trend employment projection could be accommodated by these projects.

10. Industrial land prices will be moderated through the 1990 forecast horizon by a supply of 7,800 acres of prime and good vacant industrial land being available to meet projected demand from all economic sectors of 2,100 to 2,800 acres.

11. There is an adequate supply of vacant industrial-zoned land in Sacramento County suitable for high-technology industries to meet expected growth scenarios without rezoning additional land to industrial at this time.

RECOMMENDATION

The County Planning Department should annually review trends in employment, population growth, industrial construction, and industrial land use; evaluate them in terms of the information contained herein; and report to the Board of Supervisors. This report should be prepared in the spring of each year.

I
INTRODUCTION

During the past two years, three large electronics manufacturers, expected to employ as many as 6,500 persons by 1985, have located in the Sacramento region. That they have chosen this area demonstrates the region's viability as a locus of high-technology industries. Accordingly, speculation and concern has grown over the prospect of a major industrial boom and the attendant changes in our urban environment that it would bring about.

Greatly accelerated industrial job growth will provide a much greater range of needed job opportunities in the region and a chance to reduce the area's unemployment rate. On the other hand, a major industrial boom raises the spectre of a serious housing shortage, considerable traffic congestion and further deterioration of air quality. The challenge is to provide for the needed job opportunity, direct it towards those that need it most, and at the same time minimize the undesirable impacts associated with it. An unprecedented partnership between the private and public sectors is needed not only to train the underskilled and unemployed to fill newly created jobs, but to mutually work towards meeting the housing and transportation needs that will be created by job growth.

The General Plan is the instrument for expressing the community's goals, as well as the policies and programs by which some measure of goal attainment can be achieved. The 1973 County General Plan expresses broad statements of support for industrial development backed by the designation of about 24,000 acres of Industrial Intensive land in locations throughout the Sacramento jurisdictions. The Plan includes broad housing and transportation goals and designates land uses to meet projected demands, but no attempt beyond the Industrial Intensive-Industrial Extensive demarcation has heretofore been made to link industrial development with the urban infrastructure and housing requirements that it induces. It is this policy void that is addressed in this study.

The concern for the relationship between housing and job location is relatively recent, not only in Sacramento County, but in other parts of the state as well. In general, it results from:

1. A growing awareness of the physical and psychological impacts of long-distance commutes.

2. The increasing dislocations between employment locations and residential opportunities in certain rapidly-growing areas of the state (e.g., Santa Clara and Orange Counties).

3. The generally-escalating costs of housing and the particular impact on moderate-income families.

4. The increasing costs of automobile ownership and use.

5. The growing concern for energy conservation and air quality, both of which relate directly to automobile usage.

6. The increasing difficulty of state and local governments to finance improvements to the transportation system and other necessary public services and facilities.

These concerns are reflected in recent state legislation (AB 2320) which mandates a balance between nonresidential and residentially-zoned vacant lands planned for urban areas.

Santa Clara County provides an extreme example and case study of the dislocations associated with rapid industrial growth when housing needs are not included in consideration of industrial development proposals. Here, the burgeoning electronics industry, in conjunction with large-scale aerospace manufacturing, has been an essential catalyst for South Bay urbanization.

A look at growth statistics reveals the incredible fact that during the 1970's, County population increased by 200,000, but employment grew by 300,000! Taking into account the average number of two-employee households, this implies that at least 150,000 of the net number of new jobs were filled by persons living outside the county, primarily in Alameda and San Mateo Counties

Even within the county, there are tremendous imbalances between job and housing locations. Generally, most of the major employment centers are in the North County Cities of Palo Alto, Mountain View, Sunnyvale and Santa Clara. Most opportunities for expansion of the housing supply are in the south, in an around San Jose. The City of San Jose has even sued the City of Santa Clara for not zoning sufficient land for residential use, arguing that while Santa Clara enjoys a hefty industrial tax base, the City of San Jose must provide schools and residential services to a disproportionate share of Santa Clara workers.

The desire to avoid the job-housing imbalances that have developed in Santa Clara, as well as Orange County, has prompted a major effort on the part of the South Placer County jurisdictions (with a little prompting from the state) to develop a plan and policies to provide for adequate, affordable housing near their new industrial jobs. Sacramento City, as well, has accelerated its General Plan Update, with special focus on developing an overall growth strategy for the 1980's. It is essential that unincorporated Sacramento County, with almost half the population of the three-county region, also develop a comprehensive job-housing strategy. With this need in mind, the Planning and Community Development Department secured funding for a year-long effort to identify an overall industrial growth strategy for the County.

This report is the first of three scheduled as part of the Industrial Strategy Study. If can be divided into two principal parts. The first part (Sections Two, Three, and Four) provides an overview of the range of employment growth we might expect within the Sacramento region over the next ten years, the underlying trends which determine the level of employment growth, and the corresponding relationships between employment, population, and households. Particular emphasis is given to the prospects for high-technology industry growth in the region. The second part of the report (Sections Five and Six) focuses on the demand for industrial land over the next ten years compared to the available supply.

The scope of the employment and population discussion is regional, incorporating Sacramento, Yolo, and Placer Counties. This is not only because the most accurate data is available only on a regional basis, but because the Sacramento SMSA corresponds rather closely to the labor market area and functions, by and large, as a cohesive economic unit. However, for the discussion of industrial land supply and demand, we have focused more directly on Sacamento County and its cities. The time frame of projections is 1990, which corresponds to the County's General Plan Update and is a frequent horizon year in the economic literature.

II

SACRAMENTO'S ECONOMY
EMPLOYMENT TRENDS AND PROJECTIONS

This section seeks to provide an understanding of the Sacramento region's past economic growth and to examine the prospects for the future. Primary concern is with employment, since new employment stimulates a large measure of population growth, with corresponding demands for housing and other uses of land.

We have, however, given more attention to some fundamental economic relationships which help to explain why a region grows. Our hope is that a better understanding of these relationships will enable us to better predict what changes will occur in employment growth as a result of changes and stimuli to the economy. The initial effort undertaken here should at least help to develop an awareness on the part of area decision makers of the quantitative relationships involved, and point to additional areas of investigation which would further improve our knowledge.

We will begin with a brief discussion of regional economic base theory and how to develop a relationship between base jobs and the secondary jobs they spawn. We will then look at employment trends through the 1970's and compare them with other regions of the state. Various employment projections will follow, evaluated in the context of existing trends and whether they will continue. The remainder of the chapter focuses on the prospects for rapid high-technology manufacturing growth in the region.

A. REGIONAL ECONOMIC ANALYSIS

1. Definition of the Region

In economics, the word region can mean anything from a single city to the entire western United States. In Sacramento, the word region may mean all of the county, several counties, or all of the northern Sacramento Valley, depending on individual perspective. It is important to clarify at the outset what we mean by region, since it is a term that will be used consistently through the course of this study.

The word region should correspond to the labor market area, consisting of one or more central cities and their surrounding territory which form an economically-integrated geographical unit. The labor market area includes the great majority of residences belonging to those who work within its boundaries. In this sense, it corresponds to the "commuter-shed," the area in which most workers live and commute from dispersed housing locations to more concentrated and central employment locations.

In practice, labor market areas are described by county boundaries or groups of county boundaries known as Standard Metropolitan Statistical Areas (SMSA's)* Most employment and other economic data is collected on an SMSA basis, although it is often broken down to individual counties. The Sacramento SMSA consists of Sacramento, Yolo and Placer Counties. With the exception of the north Lake Tahoe area, and possibly such peripheral

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* Defined by the U.S. Commerce Department as having one or more central core cities, considered to be socially and economically integrated, and meeting specific standards of population.

towns as Winters and Galt, the Sacramento SMSA corresponds rather well to the labor market area. Inter-county commute data from the 1970 census is supportive: the sum of commuters into the region and the sum of out-commuters were both between 5000 and 6000--fairly even and not significant compared to total workers.

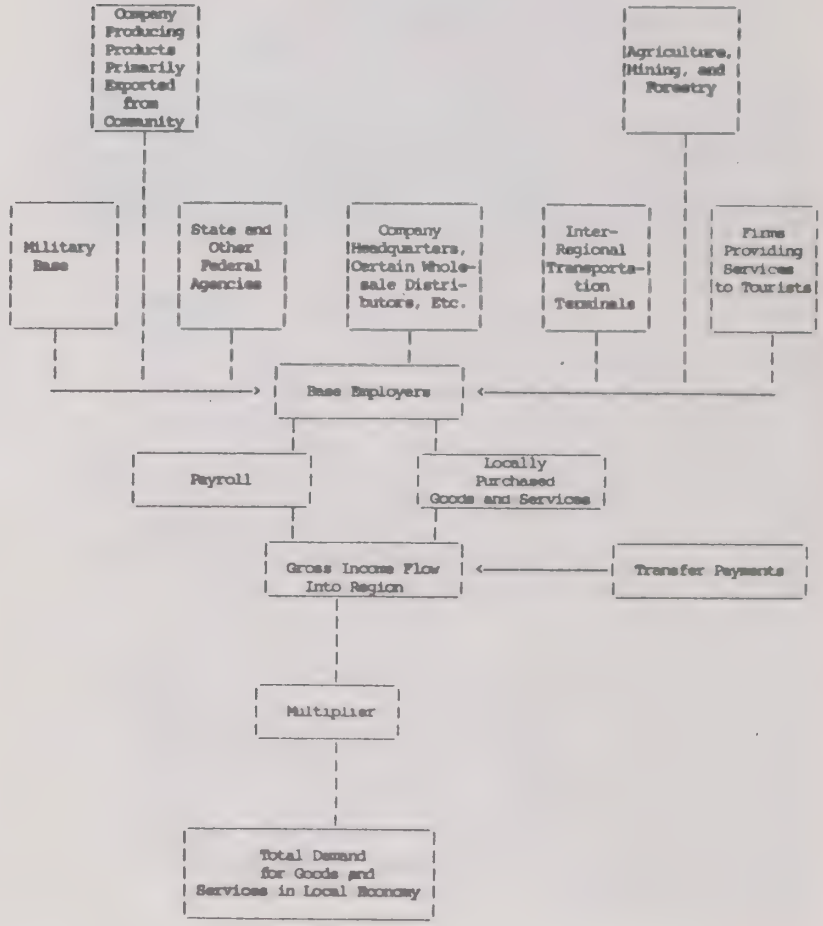
2. Economic Base Theory

Economists use various models to evaluate the economic characteristics of geographic regions and predict how a change in one component of the regional economy will influence the other components. The two most widely known models are "economic base" and "input-output" analysis. Both are "static" models; neither is designed for forecasting economic changes such as employment over extended periods of time. Both, however, have been pressed into service to develop such projections. Understanding this limitation, either method can be a helpful tool for forecasting regional economic growth when used with trend line analysis (the method used by the Employment Development Department), shift-shares analysis (used by the Center for the Continuing Study of California's Economy), or other methods.

Economic base analysis classifies all economic activities in a region as either "basic" or "non-basic." Basic activities are those whose goods and services are exported from the region and bring a flow of dollars into the region. They exist because of some resource or locational attribute intrinsic to the region. Non-base activities are those which produce or import goods and services consumed within the region by those firms and households which exist in the region. They are also frequently called secondary or service activities, terms which we will use more or less interchangeably in this report. Non-base activities can be regarded as existing because of basic sector activities.

The flow chart in Figure 1 illustrates the nature of the basic sector's influence on a regional economy. Transfer payments include military retirement, social security benefits, welfare and other state and federal fund sources which represent outside or exogenous sources of income.

FIGURE 1
RELATION BETWEEN BASIC EMPLOYMENT AND INCOME FLOW INTO THE REGION



Economic base analysis most often uses employment in each economic sector (e.g., manufacturing, retail trade, government) as a measure of each sector's role and influence in the regional economy. The analysis is based on the assumption that at a given point in time every regional economy has a characteristic ratio of basic and non-basic employment and that a change in the number of basic jobs will result in a proportionate change in non-basic jobs. The ratio of the region's total employment to basic employment is sometimes called the employment multiplier.

3. Input-Output Analysis

Economic base theory is an oversimplification which ignores three basic realities: First, multipliers change over time as economic conditions change; second, some types of basic activities may stimulate more secondary growth than others (that is, they have a higher multiplier); and third, not all service sector growth is stimulated by basic growth. Other factors, such as real personal income gains, also stimulate non-basic job growth. (See page 9 for additional discussion.)

Input-output analysis attempts to overcome these problems by setting up an accounting system for imports and exports which incorporates the overall income flow in the region. It is beyond the scope of this report to detail the mechanics of input-output analysis; suffice it to say that it is the most accurate, most complex, and most expensive method of determining an employment multiplier.

4. Our Analytic Approach

At the outset of work on this study, it was our intent to identify an employment multiplier for the Sacramento region which would enable us to apply it to one or more projections of basic job growth for the region and thereby arrive at an estimate of total projected job growth. A variety of methods of determining such a number were reviewed and are summarized in Appendix 1.

We found, however, that economic growth factors unrelated to economic base theory principles had a significant impact on the region's growth during the 1970's and were expected to continue into the 1980's. Detailed input-output studies for the Sacramento region were also not available. We therefore used the following methodology to develop the employment projections:

a. Project employment by each sector to 1990 based on existing employment growth trends.

b. Evaluate potential for slowdown of economic trends during the 1980's and adjust projections accordingly.

c. Evaluate potential for additional basic employment growth beyond that projected by existing trends analysis. Develop alternative basic job growth projections.

d. Identify an employment multiplier appropriate for that increment of additional basic jobs.

e. Determine additional jobs in the service sector which will be created by the added increment of basic jobs.

B. CHARACTERISTICS OF SACRAMENTO'S ECONOMY

1. Employment Data

Employment growth during the 1970's for each major employment sector in the Sacramento SMSA is shown in Table 1 and Figures 2 through 4. The data represents wage and salary workers by place of work. Self-employed proprietors, unpaid volunteers, and unpaid family workers are not included.* The data is based on annual unemploy-

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*Inclusion of these categories constitutes total employment. Adding unemployed persons 16 years and older gives total civilian labor force. Total labor force would include military personnel as well. The 1970 Census counted 21,500 self-employed and unpaid workers, or 6.7% of the civilian labor force at that time. Further discussion of employment categories is given in Appendix 2.

TABLE 1
WAGE AND SALARY EMPLOYMENT IN SACRAMENTO SMSA
1970-1980
(in 1000's)

		SECTOR	1970	1980	INCREASE	% INCREASE
CONVENTIONALLY BASIC		Agriculture	9.0 (1)	9.1	0.1	0
		Mining	0.1	0.5	0.4	400
	B	Durable Goods Manufacturing	10.8	14.2	3.4	31 (2)
	A	Nondurable Goods Manufacturing	11.4	13.0	1.6	14 (2)
	S	State and Federal Government	65.3 (3)	88.5	23.2	36
	I		96.6	125.3	28.7	30
	C					
CONVENTIONALLY NONBASIC		Construction	11.6	19.3	7.7	67
		Transportation & Utilities	17.3	21.7	4.4	25
	N	Retail Trade	43.8	76.5	32.7	75
	O	Wholesale Trade	10.6	17.4	6.8	64
	N	FIRE	10.4	22.3	11.9	114
	B	Services	38.5	73.4	34.9	91
	A	Local Government	43.6 (3)	52.6	9.0	21
	S		175.8	283.2	107.4	61
	I					
	C					
		TOTAL WAGE AND SALARY	272.4	408.5	136.1	50

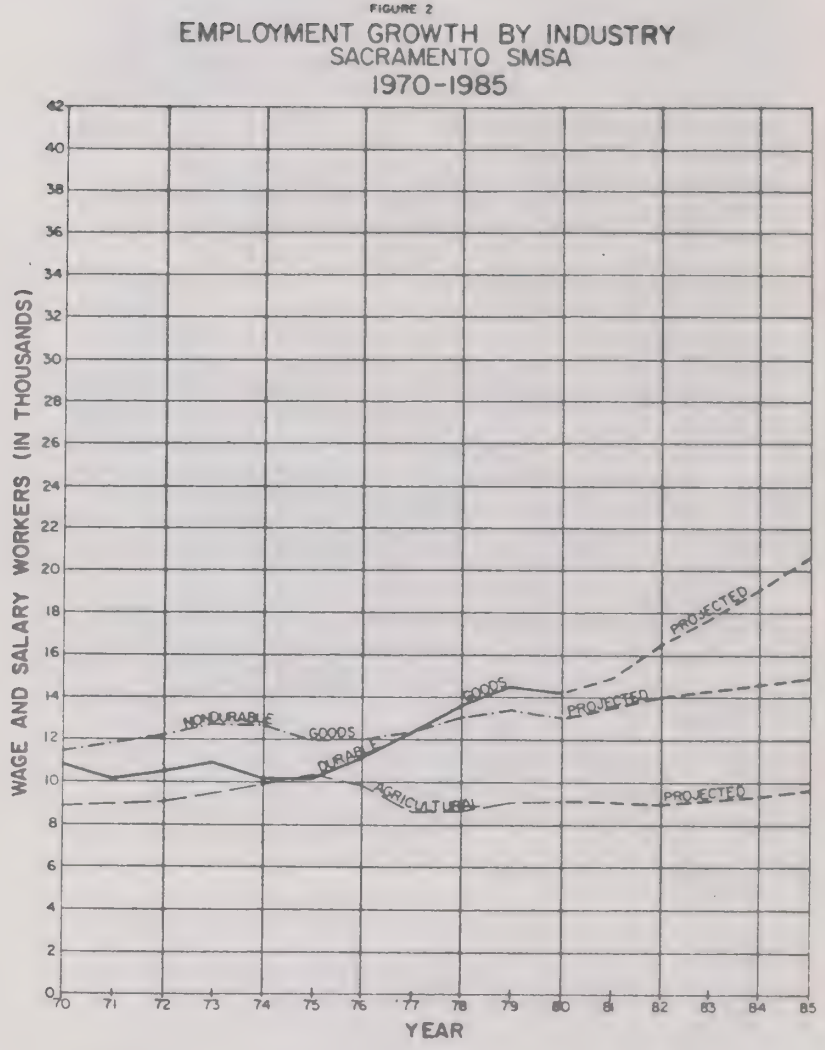
NOTES: 1. Our estimate. Agricultural worker data not available for 1970.
2. Combined manufacturing increase is 22.5%.
3. Separate government worker data not available for 1970. Sixty percent allocated to state and federal sector based on 61% in 1972, earliest year for which data available. Percentage has been stable over time: 62.7% in 1980.

SOURCE: Employment Development Department Data.

ment insurance reports by employers and is considered to be generally accurate.

During the decade, overall employment increased 50% to 408,000. This job growth can be broadly categorized as either basic or non-basic according to common economic conventions. Among the conventionally-basic sectors, the state and federal government sector increased by 23,000, or

FIGURE 2



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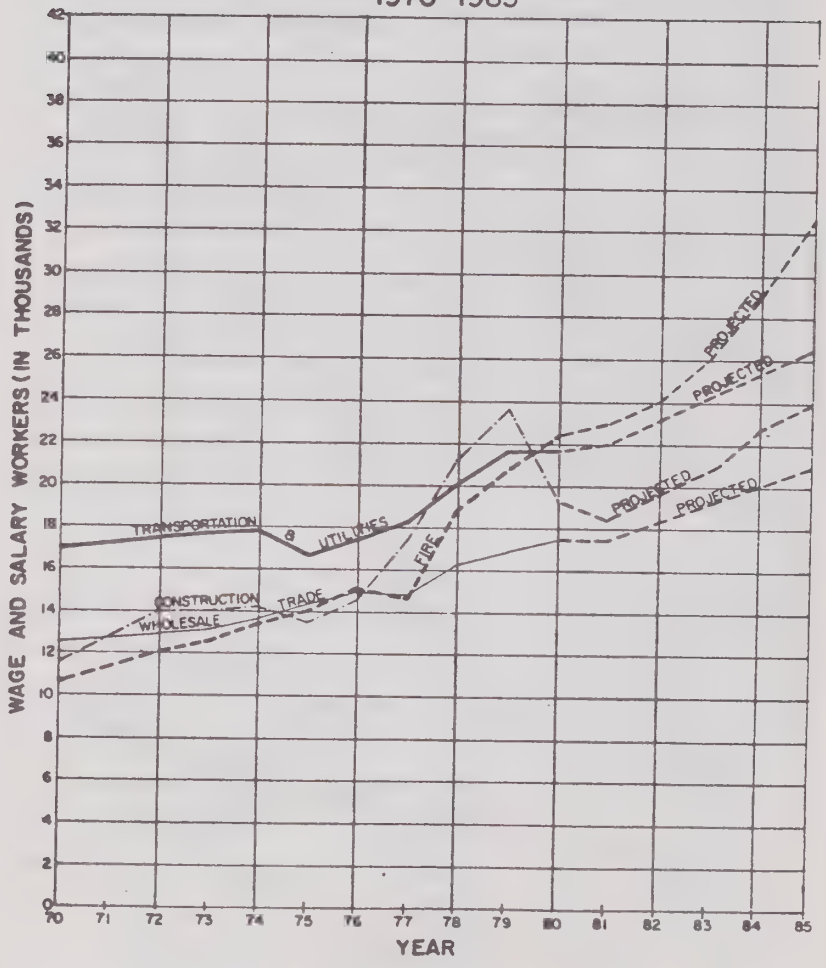
36%, and accounted for almost three-fourths of 32,000 new government jobs, including local government. Manufacturing employment, long regarded as the mainstay of most regional economies, grew by only 5000 to a total of 27,200 workers--only a 22-1/2% increase over the decade.*

The conventionally non-basic sectors, however, increased 3.7 times more than the basic sectors, accounting for over 107,000 new jobs. Fastest growing sectors were finance, insurance, and real estate (FIRE); services; and retail trade at 114%, 91%, and 75% increases over the decade, respectively. Together, these three service-oriented sectors accounted for 79,500 new jobs--58% of all those created during the decade.

The accompanying graphs show a more complete picture of employment trends over the 1970's, including dips in total employment for most sectors during the 1974-75 recession, the boom and bust cycle of the construction industry, the post-Propostion 13 impact on local government employment and the very closely related pattern of growth for the retail trade and service sectors. Most evident are the steeply rising curves for the non-basic sectors.

FIGURE 3

EMPLOYMENT GROWTH BY INDUSTRY
SACRAMENTO SMSA
1970-1985



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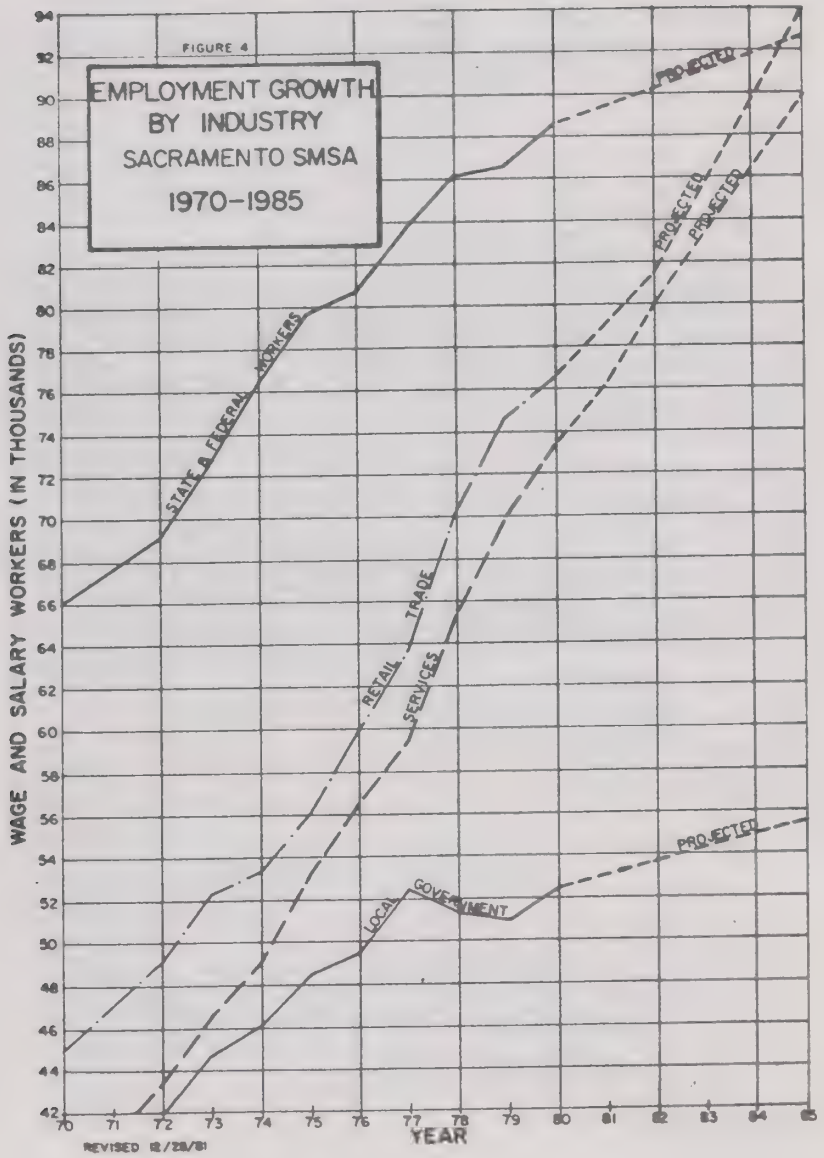
* Interestingly, this is about the same manufacturing employment as the SMSA registered in 1963--26,800 workers--during the heyday of Aerojet's space project participation. At that time aerospace industries were hailed as the opportunity to develop a solid industrial base and avoid dependence on the government sector, just as high tech industries are today. But massive layoffs in the late sixties resulted in a manufacturing employment decline of 15,000 by 1970.



2. Growth of the Service Sector

What accounted for this great increase in service sector jobs relative to basic sector jobs? It is difficult to accept the proposition that they simply are the consequence of new basic jobs as economic base theory would suggest. Most input-output models of regional economies suggest an overall multiplier of 2-1/2 to 3. Undoubtedly, there are a number of basic jobs included within the service-oriented sectors. State and federally-financed construction projects (Auburn Dam, Regional Sewer System, Interstate 5, etc.) all produced basic construction employment. Perhaps as much as 1/4 of the wholesale trade employment serves the Northern California market beyond Sacramento. Lobbyists, consultants, and those catering to the tourist and convention industry also contribute to new basic employment. It is reasonable to assume that as many as 10,000 (10%) of the new employment in the non-basic sector was basic in function. On the other hand, some of the new manufacturing and agricultural jobs were more service-oriented than basic. Examples include veterinarians, gardeners, printers, and workers producing food and wood products consumed locally. They were not, however, numerous—accounting for probably less than 2000 of the 28,700 new basic jobs. Allowing for a net crossover of 8000, this reduces the overall ratio between new basic and non-basic jobs from 3.7 to 2.7.

Regardless of the what-is-basic-what-is-not question, there appear to be some other trends in the economy which have stimulated job growth quite apart from any basic jobs stimulus. They include:

- Increased labor force participation. The Sacramento SMSA LFP rate increased from 56.13% in 1970 to 60.0% in 1980. This means that an additional 27,400 working wives, other second-wage earners, divorced heads of households, and

others entered the labor force in Sacramento over the decade (see Appendix 3). Their increased time constraints for the sake of additional disposable income helped to increase the demand for goods and services.

- Increase in household formation rates. The coming of age of the postwar baby-boom in the 1970's, as well as rising divorce rates, and increasing numbers of single person households helped generate large numbers of new households which required goods and services.

- Growth in per capita personal income. Per capita real personal income, expressed in 1980 dollars increased $2,665 or 34% over the decade in the Sacramento region. (See Table 2)

- Growth in taxable sales per capita. Even greater gains were registered in taxable sales per capita: a 48% increase from $3,800 in 1970 to $5,625 in 1980 (expressed in 1980 dollars). The larger gain in taxable sales can be attributed in part to greater consumer debt. (See Table 2)

It would seem that these trends demonstrate a significant increase in the demand for goods and services which led to some of the increases in population serving, or non-basic, employment. Moreover, as the Sacramento region grew larger, it could sustain a greater variety of economic functions which previously came from outside the region. A prime example of this phenomenon, called import substitution, can be seen in the growth of regional wholesale distribution facilities.

TABLE 2
PER CAPITA INCOME AND TAXABLE SALES GAINS
SACRAMENTO SMSA
1970-1980

	1970 (1)	1980 (2)	INCREASE (3)	%
Real Per Capita Personal Income (1980 $)	7,734.4	10,400.0	2,765.6	34
Taxable Sales Per Capita (1980 $)	3,793.6	5,626.3	1,832.6	48

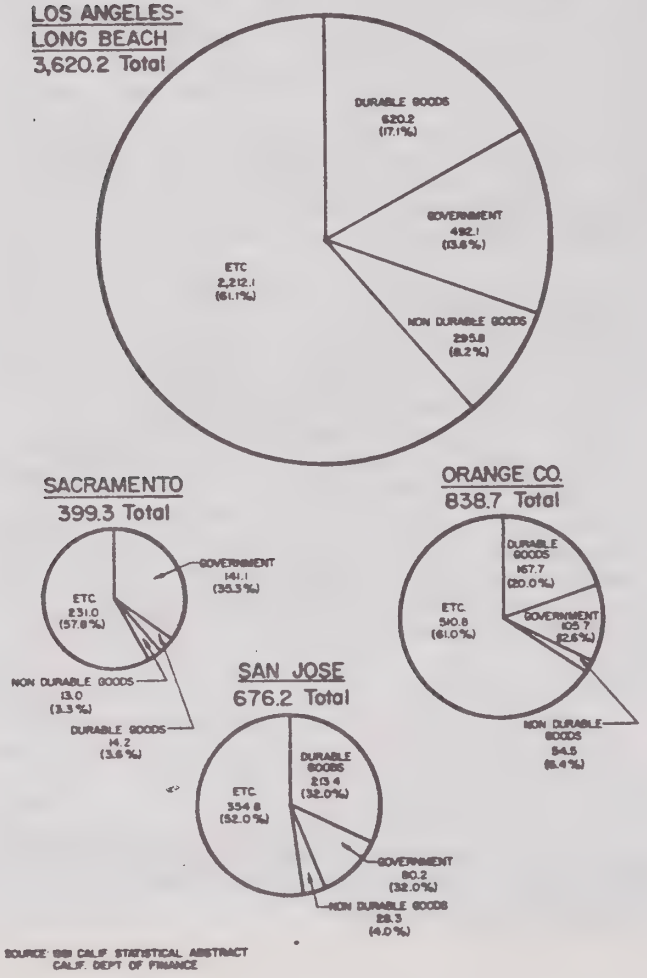
1. Based on 1970 population of 807,300.
2. Based on 1980 population of 1,020,500.
3. Estimate for 1980. 1979 = 10,139.3.

SOURCE: Center for the Continuing Study of California's Economy.

3. The Sacramento Region in Comparison

In comparing Sacramento's economy with three other major SMSA's in the state, it becomes all the more evident that Sacramento's is a heavily government-based economy: 35% of the jobs as opposed to 12-14% in Los Angeles, Orange County, and the San Jose SMSA's (See Figure 5). Durable and non-durable goods manufacturing each account for only about 3%

FIGURE 5
1980 EMPLOYMENT DISTRIBUTION IN MAJOR ECONOMIC REGIONS OF CALIFORNIA



SOURCE '80 CALIF STATISTICAL ABSTRACT
CALIF. DEPT OF FINANCE

of the total employment in Sacramento compared to much higher percentages in the other SMSA's. This has led a number of business leaders in the community to strongly support efforts to attract new industry to the region so that a more diversified and presumably more stable regional economy can evolve.

C. EMPLOYMENT GROWTH IN THE 1980'S

The traditional way to forecast economic growth is to look at employment trends of the recent past and extend them into the future. The unpredictability of national economic cycles, oil supply cutoffs, major government spending cutbacks, and industrial relocation decisions make any kind of long-range employment projections a risky venture. Nevertheless, they are an essential element of economic forecasting and the Employment Development Department (EDD), Security Pacific Bank, and the Center for the Continuing Study of California's Economy have all made forecasts for the metropolitan area.

1. EDD's Projection

The Employment Development Department is the basic source of most projections; others are usually based on their data. EDD's forecast for 1985 employment growth is excerpted in Appendix 4. This forecast utilized 1976 data projected to 1980 and 1985. This estimate was made in September 1979 and was revised at the last minute to include significant increases in durable goods to reflect Hewlett Packard's announced plans. EDD projected an increase of 86,500 jobs between 1980 and 1985, an average annual growth rate of 3.9%.*

You will note, however, a substantive difference between 1980 figures in this projection and the actual 1980 employment figures in Table 1. This is because self-employed and unpaid family workers are included in the projections. More importantly, most government workers were assigned to the sector which most closely fit their government occupations, thereby altering the distribution of employment among sectors (See note in Appendix A 4-1).

Jenkins & Harnish, consultants for Sacramento City's General Plan Update, have utilized the average annual growth rates from EDD's projections in Table A 4-1 and applied these to the data in Table 1 to arrive at an alternative set of employment projections. These numbers more closely reflect actual sector employment and are more useful in distinguishing between base and non-basic employment. This method yields a 1985 employment of 488,000, an increase of 79,600 jobs over the five-year period (See Table A 4-2 in the Appendix). The difficulty here is that the sum of the 1985 employment for each sector is only 474,000, some 13,400 less than the separately-calculated total growth based on a cumulative rate of 3.9% per annum.

2. Our Projection

We have reviewed the growth trends of each sector and made projections to 1985 as shown on the dashed lines in Figures 2, 3, and 4. For most sectors, the rate of growth reflects a continuation of the mid to late 1970's trends. Results were fairly close to values calculated by Jenkins and Harnish. However, we have made some adjustments, notably in the projections for construction, wholesale trade, manufacturing, services, and government (state and federal workers are distinguished from local government workers in the analysis). These revised projections yield a 1985 employment of 482,800, midway between the discrepant sums in the Jenkins-Harnish analysis.

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*EDD is in the process of updating its projections utilizing 1980 data. This updated report is scheduled for release this spring.

Table 3 summarizes the results of our adjustments organized according to conventionally-basic and non-basic sectors. The net increase according to this version is 74,400 jobs by 1985. We have also extended the projections forward to 1990, assuming that existing rates of growth for each industry will continue. The construction sector has been adjusted downward to reflect the cyclical nature of that industry. Compounding growth to 1990 yields a projected increase of 165,000 employees by 1990, including a gain of 90,000 in the last half of the decade. Note that the percentage rates of increase are compound rates as opposed to annual averages in the appendix tables.

TABLE 3
PROJECTED WAGE AND SALARY EMPLOYMENT GROWTH
IN SACRAMENTO SMSA
1980-1990
(in 1000's)

	SECTOR	1980	1985	1990	1980-1990 INCREASE	ANNUAL % INCREASE[1]
CONVENTIONALLY BASIC	Agriculture	9.1	9.6	10.1	1.0	1.1
	Mining	0.5	0.6	0.6	0.1	—
	Durable Goods Manufacturing	14.2	21.0	31.1	16.9	8.1
	Nondurable Goods Manufacturing	13.0	15.0	17.3	4.3	2.9
	State and Federal Government	88.5	92.0	95.6	7.1	0.8
		125.3	138.2	154.7	29.4	2.1
CONVENTIONALLY NONBASIC	Construction	19.3	24.0	26.8	7.5	3.3
	Transportation & Utilities	21.7	26.5	32.4	10.7	4.1
	Retail Trade	76.5	95.0	118.0	41.5	4.4
	Wholesale Trade	17.4	21.0	25.3	7.9	3.8
	FIRE	22.3	32.6	47.7	25.4	7.9
	Services	73.4	90.0	110.3	36.9	4.2
	Local Government	52.6	55.5	58.6	6.0	1.1
		283.2	344.6	419.1	135.9	4.0
	TOTAL WAGE AND SALARY	408.5	482.8	573.8	165.3	3.5

1. Compound annual growth rate.

SOURCE: Sacramento County Planning Department.

TABLE 4
COMPARISON OF BASIC JOB GROWTH PROJECTIONS
1980-1990

	COUNTY PROJECTIONS (1)	CCSCE PROJECTIONS (2)
Agriculture and Mining	1,100	- 700
Transportation and Communication	—	600
Durable Goods Manufacturing	16,900	10,000 (3)
Other Manufacturing	—	2,900
Nondurable Goods	4,300	—
State and Federal Governments	7,100	18,000 (4)
	29,400	30,800

1. Source: Sacramento County Planning Department.
2. Source: Center for the Continuing Study of California's Economy.
3. All in high technology. No gains projected for aircraft and space.
4. Gains of 15,800 for state government, 1,000 for state education, and 1,300 for federal government.

The conventionally-basic sector, according to Table 3 data, will increase by about 30,000, similar to the gains reported in the last decade. However, the relative contribution of the government and manufacturing sectors is reversed: government will gain only about 7000 employees as opposed to 23,000 in the 1970's and manufacturing will increase by 21,000 as opposed to only 5000 in the 1970's. As manufacturing sector growth takes up the slack in government growth, the economy will not only maintain a healthy pace of growth, but will increase in diversity and overall stability.

The Center for the Continuing Study of California's Economy has projected almost the same level of basic job growth in the region: 30,800 new jobs, or 1400 more than we have estimated. The subclasses in the Center's estimate are a little more precise than ours. The primary difference is the inclusion of transportation and communication basic jobs and the lumping of non-durable goods with other manufacturing (See Table 4). The Center is more optimistic in projecting government sector growth. Almost 90% of the 18,000 gain will come from state government gains. Agriculture and mining will lose 700 laborers and manufacturing will increase by 12,900, most of which will be in the high technology sector.

3. Prospects for a Slowdown in Job Growth

In looking at a projection of existing trends which yields a ten-year job gain of 165,000, the most important question is, will the trends of the 1970's extend through the 1980's? Of course, no definitive answer can be offered, but some insights are possible. Factors which may exert a downward influence are demographic changes leading to a slowdown in job creation, leveling off of the labor force participation rate, housing costs, and the overall productivity of the national economy. The potential for an increase in the rate of job growth caused by rapid high technology development is examined in the next section.

Demographic Changes. The Palo Alto-based Center for the Continuing Study of California's Economy has evaluated national demographic and economic trends, allocated job and population growth to California, and in turn developed projections for each of 7 different economic regions in the state, including the Sacramento SMSA. A key finding of their recently-released report California Growth in the 1980's; Update 1981, is that jobs will grow at slower rates based primarily on demographic changes in age distribution and labor force participation rates. The slowdown in job growth will be more pronounced in the latter half of the 1980's. Although the report does not describe in detail the methodology used to make the job projections, it appears that national job growth was first estimated by demographic analysis, then successively allocated to California and its seven regions based on a variety of trends. The study projected national job growth of 16.4 million for the 1980's, a drop of 3.8 million from the 20.3 million gain registered the previous decade. This value was calculated using the growth in population 16 years and older (13.8 million), the labor force participation rate (64.7% increasing to 67.9%), unemployment rates (7.1% dropping to 6%), and the jobs/employed persons ratio (a measure of moonlighting, projected to drop from 1.058 to 1.037). Essentially, this is a supply-side calculation; it presumes that the number of jobs will be limited by the number of people available to fill them.

There are some problems with this approach. First, it does not reflect the very large increases in immigration over the last few years. Secondly, it would seem that if labor demand exceeds supply, the jobs/employed persons ratio would increase rather than decrease. Most importantly, slow job growth nationally does not mean that all regions of the country will also experience the same phenomenon. Some regions with particularly robust economies will continue to attract large numbers of in-migrants to their area at the expense of other regions. It is quite possible that the Sacramento region will be in the former category.

Labor Force Participation Rate. Among the trends noted in Security Pacific Bank's recent report on the Central Valley's economy was a levelling off of the number of women entering the work force in the latter half of the 1980's. This would mean that one of the stimuli to service sector growth--two wage earning families--will be moderating. We would expect this to have a slight downward impact on the retail goods and service sectors.

Housing Prices. Most difficult to assess is the influence of housing prices on job growth. It is too soon to tell whether the phenomenal growth in housing prices in other regions will substantially affect rates of job growth in those regions, but it is causing concern among the business community. The California Roundtable, a group of the state's top business executives, has said "the high cost of housing is having a feedback effect on the entire economy and is posing a serious threat to continued economic growth in California." Theoretically, there is an equilibrium relationship wherein disproportionately low housing costs in one region compared to others will stimulate job growth in the more economical area until such time as demand escalates housing costs to a more competitive level. If relative housing costs tip

the other way, job growth would be expected to slow as firms locate elsewhere. Although this is a great oversimplification of an imponderable number of factors, it would seem that if housing prices in Sacramento do rise to approach those of other regions, a major attractive characteristic of the area will be diminished. This could affect the rate of job growth.

Housing prices impact the economy in other ways as well. High prices force many residents to stretch their percentage of income allocated to housing to maximum levels, thus reducing the amount of money available for other goods and services. Variable rate mortgages may also be an important factor as they become more prevalent in the future, replacing the fixed rate mortgage that provided owner's with more disposable income as they received cost-of-living raises (which included a housing inflation component) in an inflationary economy. On the other hand, high housing costs will stimulate more households to cooperate in their living arrangements, possibly reduce household formation rates below what we might expect from past demographic trends, and increase the number of second and third wage earners in households. If this happens, it could reverse the predicted slowdown in labor force participation rates.

At this point in time, too little is known about the impact of housing costs on job growth to draw any definitive conclusions. The relationship is complex and potentially significant. If housing costs increase substantially, particularly in proportion to other regions, it would seem they would have a moderating influence on job growth.

Productivity of the National Economy. Productivity growth, as measured by output produced per man-hour of work, is a critical determinant of real income gains, and real income gains are an important influence on job growth in the service sector. The Center for the Continuing Study of California's Economy has developed two assumptions for productivity growth and translated these into high and low projections for real personal income and

TABLE 5
PROJECTED GROWTH
IN INCOME AND TAXABLE SALES
SACRAMENTO SMSA
1980-1990

		LOW GROWTH				HIGH GROWTH			
	(1) 1980	(2) 1985	(3) 1990	1980-90 INCREASE	%	(2) 1985	(3) 1990	1980-90 INCREASE	%
Real Per Capita Personal Income (1980 $)	(4) 10,400.0	10,633	11,361	961	9	11,275	12,844	2,444	24
Taxable Sales Per Capita (1980 $)	5,626.3	6,404	6,894	1,268	23	6,842	7,765	2,139	38

1. Based on 1980 population of 1,020,000.
2. Based on 1985 population of 1,140,000.
3. Based on 1990 population of 1,262,000.
4. Estimated for 1980. 1979 = 10,139.3.

SOURCE: Center for the Continuing Study of California's Economy.

taxable sales for each of California's seven economic regions. Their results are shown in Table 5. In comparing this data with that for the 1970-80 period in Table 2, it is clear that both the low and high projections are well below the real gains registered during the 1970's. It would appear that, if the assumptions and methodology used to obtain these numbers are reasonable, that the job growth stimulus associated with personal income gains will be notably less in the 1980's than the 1970's.

The CCSCE Job Projections. The Center for the Continuing Study of California's Economy has projected a 67,000 increase in regional jobs by 1985 and a 125,000 increase by 1990. Projections developed earlier in this report were 74,400 new jobs by 1985 and 165,000 by 1990. The Center's 1990 projection is 40,000 less than that based on existing trends, although the number of new basic jobs would be about the same in both projections. Reduced service sector growth, an overall slowing of national economic growth, and no major surge in high technology growth beyond that already projected are all implicit in the Center's projections. As such, they represent a lower limit forecast of job growth.

A closer look at the Center's projection for Sacramento indicates that the ratio of new total jobs to projected new base jobs is considerably lower for Sacramento than any other region of the state. Yet for the decade of the 1970's, the ratio was higher than any other region of the state (See Appendix 5). In San Diego, by contrast, a projected increase of 34,400 basic jobs during the 1980's--only slightly more than that projected for Sacramento--is expected to lead to a total increase of 222,300 new jobs for the decade. This dramatic turnaround cannot be explained in terms of the factors previously described since they should be impacting all regions of the state. It would seem that the 125,000 new job projection for Sacramento is not consistent with growth expected elsewhere in the state and should be revised upward.

If the nationwide demographic trends operating to limit job supply on a national basis are discounted, at least as far as their influence on Sacramento's economy is concerned, and if the Center's 125,000 projection is disregarded as unreasonably low, then a somewhat less conservative estimate, which still takes into account other moderating influences, would appear to be more realistic. On balance, it is appropriate to expect some decline in the growth rate of the retail trade, services, and FIRE sectors after 1985. Total job growth in the Sacramento region is more likely to be between 140,000 and 150,000 over the next ten years.

III
HIGH TECHNOLOGY INDUSTRIES AND THE SACRAMENTO REGION

It is not the potential for a slowing of economic growth in the 1980's, but rather the prospect of a major surge in high technology industry growth in Sacramento that has sparked intense interest in the planning and development community of Sacramento. In recent months, rosy projections of fantastic growth potential have been bandied about in the press and by those promoting expansion of the region's industrial base. Consultants for the South Placer communities spoke of 30,000 high tech employees for just South Placer County--a figure entirely based on supply-side considerations, but one which nevertheless assumed the mantle of certainty in the minds of many. Unfortunately, there have been only limited attempts to date to carefully assess the employment growth potential of high technology industries over the coming years and the relative amount of this growth the Sacramento region can expect to attract.

Such an assessment is not an easy task. High technology industries, particularly electronics, have a record of out-pacing most growth projections as they have responded to an extraordinary pace of technological innovation. Yet, many uncertainties face the electronics industry as it enters the 1980's. The semi-conductor sector is mired in an extended slump, and market analysts wonder to what extent Japan will make further inroads into world markets before U.S. firms can recover. Efforts to mechanize and robotize electronics production processes--again, with Japan leading the way--may dramatically change employment demands in the late 1980's and early 1990's. And even with continued rapid growth, it is very difficult to forecast with confidence how much plant expansion the Sacramento region might capture as industries spread out worldwide from their embryonic centers in the Silicon Valley, Orange County, and the Boston Beltway.

The following paragraphs summarize what little work has been done to forecast high tech employment gains. We will begin first with a definition of the somewhat elusive term "high-tech" and the kind of industries included within its spectrum. We will then look at national high tech growth, examine California's share of that growth, and examine the relative employment shifts in each regional market of California. This process, called a shift-shares analysis, provides a basis for understanding the current structure of the economy and its recent changes, permiting judgments to be made about competitive advantages and the extent to which they will continue in the future. This analysis must be conducted in light of high technology industry's locational requirements and the Sacramento region's ability to compete effectively. We will conclude with a high-trend projection for Sacramento based on assumptions that the region will benefit significantly from a superior competitive position as perceived by high-tech industries.

A. HIGH TECHNOLOGY INDUSTRIES DEFINED

"High-tech" is a general term which characterizes those industries which are heavily oriented to research and development, with products requiring the application of advanced scientific understanding at the leading edge of technological innovation. Typically, the scale of production lends itself to a physical space with a "campus-like setting." The high technology industry thus has the ability to integrate much more fully than other manufacturing industries with office, warehouse, commercial, and residential uses in the surrounding area. In addition, high technology firms are commonly characterized as labor-intensive in their production processes, very growth-oriented, and environmentally "clean," although some produce toxic wastes.

In general, the electronics and instrumentation industries are most commonly associated with high technology industries. These include the following industry groupings:

	SIC CODES
Computers and Peripheral Equipment	3573
Telephone and Telegraph Apparatus	3681
Radio and Communication Equipment	3651-2, 3662
Electronics Components	3671-9
Scientific and Controlling Instruments	3811, 3823-9
Medical and Dental Instruments	3693, 3841-3
Optical and Opthamalic Equipment	3832, 3851
Photographic Equipment, Supplies	3861

The SIC codes most appropriate for each industry are taken from the Standard Industrial Classification Manual prepared by the Office of Management and Budget. Excerpts describing these industries in more detail are included in Appendix 6. We have not included aerospace industries, although some analyses do so.

In making broad distinctions between industries, it must be kept in mind that many peripherally-related products are lumped together. For example, SIC Code 3662 (Radio and TV Communication Equipment) includes a whole range of products from garage door openers and burglar alarms to particle accelerators and satellites. Not all of these different products should be regarded as "high technology" in scope.

On the other hand, a number of activities associated with the processing of information or servicing of high-technology equipment are occasionally identified as high-technology industries. The so-called software industry is a primary example. While the production of pre-packaged computer programs for general distribution is a rapidly-growing sector which is essentially basic in nature, the fact is that most of the software industry is still service-oriented and is so classified in the SIC Manual. We have not included it in the estimates of high-technology employment which follow.

B. NATIONAL GROWTH PROSPECTS

On a national level, there is much optimism for the continued growth of high-technology-oriented industries. "Electronics Weekly," a trade magazine reporting relevant information on the electronics industry, projects annual growth of 10-20 percent for major electronics and computer firms. The American Electronics Association expects that its member firms will need more than 253,000 engineers, technicians, assemblers, and drafting personnel by 1985. Market forecasts for sales of different types of electronics components and equipment are equally bullish.

The only thorough, long-range forecast that we have located is found in the August 1981 "Monthly Labor Review," a publication of the U.S. Department of Commerce. This publication gives low- and high-trend industry output and employment projections to the year 1990 for most sectors of the economy. These projections, along with the assumptions underlying them, are given in Table 6 for high technology industries. So far as can be determined, these categories correspond to the categories and SIC codes previously listed, except that radio and television receiving sets (forecasted to have little, if any, employment growth in the 1980's) are excluded.

TABLE 6
NATIONAL GROWTH IN HIGH-TECHNOLOGY EMPLOYMENT
1969-1990
(in 1000's)

INDUSTRY	1969	1979	Increase	%	(1) LOW TREND 1990	1979-1990 INCREASE	%	(2) HIGH TREND 1990	1979-90 INCREASE	%
Computers and Peripheral Equipment	224	350	126	56%	552	202	58%	614	264	75%
Telephone and Telegraph Apparatus	146	169	23	16%	201	32	19%	231	62	37%
Radio and TV Communication Equipment	409	357	-52	-13%	434	67	19%	433	76	21%
Electronics Components	394	525	131	33%	666	141	27%	669	144	27%
Scientific and Controlling Instruments	195	218	23	12%	252	34	16%	296	78	36%
Medical and Dental Instruments	82	141	59	72%	189	48	34%	224	83	59%
Optical and Opthamalic Equipment	75	82	7	9%	92	10	12%	102	20	24%
Photographic Equipment and Supplies	111	134	23	21%	144	10	7%	165	31	23%
	1636	1976	340	21%	2520	544	28%	2704	728	37%

(1) Assumes decline in labor force expansion rate, continued high inflation, moderate productivity gains, and modest increases in real output and employment.
(2) Assumes economy is buoyed by larger labor force groups, much lower unemployment rates, higher production, dampening of price increases, and greater improvements in productivity.

SOURCE: United States Department of Commerce, Monthly Labor Review, August 1981.

According to this source, combined high-technology industry growth to 1990 will range between 544,000 to 778,000 new jobs, depending on the overall performance of the national economy. Electronics components and computers will dominate this growth with somewhere between 56% and 63% of the total. The high-trend projection of 408,000 new jobs is somewhat more conservative than the electronics industry's projection of 250,000+ new jobs by 1985, assuming average annual growth is consistent over the ten-year period.

C. CALIFORNIA'S HIGH-TECHNOLOGY GROWTH PROSPECTS

1. California's Share of National Growth

The Center for the Continuing Study of California's Economy has analyzed historical changes in California's share of national high-technology growth and projected high-technology growth for the state to 1990. Table 7 summarizes their analysis and shows that during the 1970's, California's share of high-technology jobs increased from 15% to 20% and that California captured 38% of all such jobs.

It is not clear whether low- or high-trend national job growth figures (see Table 6) were used in making the Center's projection to 1990. Generally speaking, the Center's projections appear to be conservative, and we have assumed it is based on the low-trend projection. For California, the Center's report projects an increase of 113,000 high-tech jobs in the state by 1990. This is a 27% increase over the ten-year period. It is a much slower rate than the 70% growth that the state experienced during the 1970's when 172,000 new jobs were created. It represents an increase of only 1% in California's share of national high-technology jobs (low trend) between 1980 and 1990, as opposed to a 5% shift in the previous decade. California is expected to capture only 26% of all new jobs compared to 38% for the prior decade.

TABLE 7
CALIFORNIA SHARE OF NATIONAL
HIGH TECHNOLOGY GROWTH

	1970	1980	1990	1970-80 INCREASE	1980-90 INCREASE
California	247	419	532	172	113
National	1615	2063	2500 (1)	448	437 (1)
% of National	15.3%	20.3%	21.4%	38.4%	25.8%

(1) Low trend prediction from Table 6.

SOURCE: Center for the Continuing Study of California's Economy, except as in Note (1).

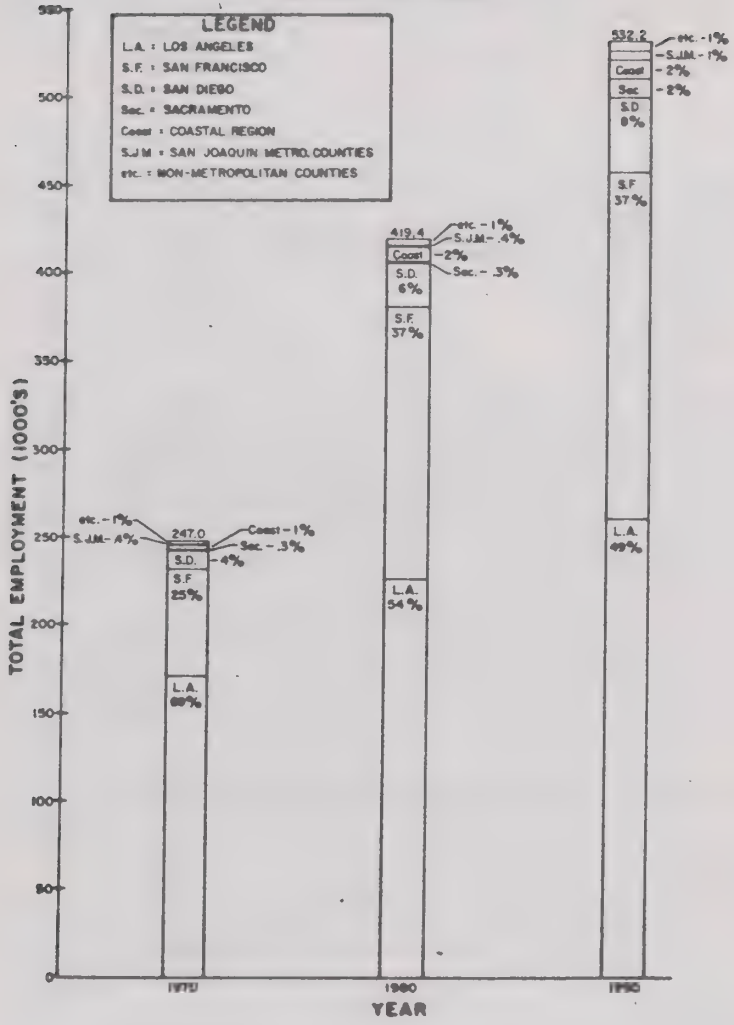
It is clear from these numbers that the Center expects an increasing number of firms to choose locations outside of California when they expand. Reasons for this are not explicitly stated in the report, but the high cost of commercial/industrial land, high housing costs, and related recruitment difficulties in the Los Angeles and San Francisco metropolitan regions are probably the principal factors. If national high-technology job growth is greater than anticipated, and if other regions of California compete more effictively with out-of-state locales for the new jobs, then those projections could be substantially low.

2. Distribution of High-Technology Jobs in California

The regional distribution of high-technology employment between 1970 and 1980, and as projected by the Center for the Continuing Study of California's Economy, are depicted in the bar graphs of Figure 6 and Table 8. They show rapid gains in the Bay Area's share of jobs at the expense of the Los Angeles region during the 1970's. Other regions of the state experienced little change in their share of the state's high-technology jobs.

Looking towards 1990, the Center expects the Bay Area to maintain its 37% share by capturing some

FIGURE 6
REGIONAL DISTRIBUTION OF HIGH TECHNOLOGY EMPLOYMENT IN CALIFORNIA 1970-1990



42,400 jobs over the decade, or 38% of the state's total. Los Angeles will still get about 1/3 of the state's new high-tech jobs, as it did during the 1970's, but by 1990, it will have less than half of the state's total, compared to almost 70% in 1970. Sacramento and San Diego are both expected to capture about 10% of the new jobs over the decade. This will give Sacramento about 2% of the total high-tech jobs expected in 1990. Table 8 shows that most of this gain will be at the expense of the Bay Area, which will drop from 54% of all new jobs in the 1970's to 38% during the 1980's.

The conclusion that these numbers lead to is that the increment of national high-technology growth that California does manage to attract will continue to be distributed among the regions of the state in approximately the same manner as occurred during the 1970's, except that the Sacramento region will capture about 10% of high-tech growth that would otherwise have occurred in the Bay Area. Therefore, the Center's projections are basically a continuation of existing trends, after accounting for the announced plans of Hewlett-Packard & Shugart regarding Sacramento, but at lower rates of growth reflecting greater competition for high-technology jobs from other states.

There are those who would argue that these numbers are excessively conservative as they concern Sacramento County; that in fact, the attributes of Sacramento are sufficient to make it highly competitive with the rest of the nation and that the 1980's will see the region capture a much larger proportion of high-technology growth. Before turning to the potentive magnitude of that growth, it is worthwhile to look briefly at some of those attributes.

TABLE 8
REGIONAL SHARE OF 1980-1990
HIGH TECHNOLOGY JOB GROWTH

	1970-80 INCREASE	% OF TOTAL	1980-90 INCREASE	% OF TOTAL
Los Angeles	54,700	32	36,700	33
San Francisco	93,000	54	42,400	38
San Diego	17,600	10	12,000	11
Sacramento	900	—	10,000	9
Coastal Region	3,300	2	6,600	6
San Joaquin Metro	1,300	1	2,500	2
Non-Metro	1,600	1	2,000	1
TOTAL	172,400	100	112,900	100

SOURCE: Center for the Continuing Study of California's Economy.

D. SACRAMENTO'S SUITABILITY FOR HIGH-TECHNOLOGY INDUSTRIES

1. Locational and Site Requirements

The electronic and related high-tech industries have their own special set of location and site requirements. In a recent survey conducted for the City of Sacramento by the consulting firm of Brown and Caldwell, high-tech firms located in the Bay Area were asked to rate the importance of certain location and site variables in considering the future location of their operations. The results of this survey are summarized in Table 9. Both locational factors (characteristics more or less common to the region) and site specific factors are included in the ranking.

The results of the survey indicate first of all that there is no consensus among the respondents as to the most important location requirements. It appears that the six most important location and site requirements are a) government and public attitudes toward industrial growth, b) reliable energy source, c) site acquisition costs, d) availability of skilled labor, e) housing availability and costs, and f) labor force costs.

In reviewing the results, one might keep in mind the possibility of bias built into the survey in regards to assessing locational requirements. (Note the high importance of government and public attitudes as a response to a study conducted for the City of Sacramento.) However, the possibility of bias is a weakness that the survey method must always confront. As such, the survey is useful in centering attention on some of the more important location and site factors.

2. The Sacramento Region's Attributes

This list of locational and site requirements is useful in focusing attention on Sacramento's qualifications as a high-technology locus. In planning for the industrial development of the

TABLE 9
RATING OF LOCATION AND SITE REQUIREMENTS AND MARKET POTENTIAL FOR THE CITY OF SACRAMENTO, SUMMARY OF SURVEY RESPONSES

MOST IMPORTANT LOCATION AND SITE REQUIREMENTS	(1) WEIGHTED RATING VALUE	RATING OF SACRAMENTO COMPARED TO OTHER POTENTIAL LOCATIONS IN THE UNITED STATES, PERCENT (2)			
		GOOD	FAIR	POOR	NOT SURE
1. Government and public attitudes toward industrial growth	161	11	26	11	53
2. Reliable energy source	159	24	26	11	37
3. Site acquisiton costs	155	29	42	5	21
4. Availability of skilled labor	153	34	39	8	18
5 Housing availability and costs	153	53	32	0	16
6. Labor force costs	149	32	47	5	16
7. Availability of unskilled or semiskilled labor	140	34	39	8	18
8. Quality of primary and secondary schools	140	11	26	11	53
9. Public safety services	139	***	***	***	***
10. Electrical energy costs	134	11	29	11	47
11. Cultural/recreation activities	124	71	18	3	8
12. Availability of truck transportation	120	***	***	***	***
13. Proximity to airport with convenient flight schedules	120	32	26	11	29
14. Quality of nearby land development	110	***	***	***	***
15. Freeway access	106	71	24	0	5
16. Contiguous land uses	102	***	***	***	***
17. Existing industrial zone district	100	***	***	***	***
18. College and university research and training capabilities	98	24	29	3	45
19. Natural gas service	93	***	***	***	***
20. Unemployment rate trend	92	34	39	8	18

(1) Calculated from total response to question number 15 of survey (134 responses).
(2) Response to question number 16 by firms who have considered Sacramento as a potential location for a new plant site (38 responses).
*** Site specific requirement—not rated on a regional basis.
SOURCE: Brown & Caldwell; High Technology Industry Site Study; July 1981.

Sacramento region, thought must be given to these suggested locational factors in order for orderly and well-balanced growth to occur. Therefore, a discussion of the locational factors and Sacramento's attributes, in terms of these requirements, is appropriate at this point.

Government and Public Attitudes Towards Industrial Growth. Generally speaking, the decision-making bodies in the local government and public sectors are receptive to industrial growth in the Sacramento area. In order to provide a generally-attractive range of options for new industrial development, the appropriate planning agencies have set aside substantial acreage for the development and growth

of industry. In addition, local organizations such as the Sacramento Area Commerce and Trade Organization (SACTO) actively promote Sacramento in seeking new industry for the area.

Energy Costs and Reliability of Energy Source. The rise in energy costs has increased the importance of electrical energy as a location factor. The Sacramento Metropolitan Utility District's (SMUD) rate charges for electric power are among the lowest in the state, making the region highly competitive for firms with large electrical energy requirements.

More important than the cost of energy, however, is the reliability of that energy source. According to the Brown and Caldwell survey, the availability and reliability of electricity is the most important utility requirement of the electronics and semiconductor industries and one of the most important factors overall in selecting a new location for a plant site. The semiconductor manufacturing process involves baking steps which utilize very expensive ovens. This requires a consistent supply of energy to ensure product quality and avoid ruining the ovens.

SMUD officials have stated that within their service area, they can provide the required electrical power to any of the prime industrial development areas within a reasonable development period. In regards to uninterrupted service, the SMUD system averages one hour per year per customer of outages with two hours per year considered to be representative of a good interruption record for utilities in general. SMUD adds that longer outages occur in more remote areas.

Natural gas requirements are primarily for space heating. High-tech industrial usage does not represent above-average industrial requirements in this respect.

Site Acquisition Costs. One of the most important advantages that the Sacramento region has to offer prospective new industries is the comparatively low cost of industrial-zoned land--one-half to one third less than for comparable sites in other major metropolitan areas. For example, improved land costs in Sacramento are typically in the $3-5/sq. ft. range, while in the Santa Clara Valley, they hover in the vicinity of $13.50/sq. ft.

Housing Availability and Costs. An increasingly-important factor to industries looking for plant expansion sites is the cost of housing in the region, since high housing costs seriously interfere with recruiting efforts in Santa Clara and Los Angeles. To date, this factor, along with industrial land costs, is one of Sacramento's greatest attractions. The median selling price of homes in Sacramento in November 1981 was $73,500, compared to $100,000 in San Diego, $106,000 in Los Angeles, $125,000 in Orange County, and $129,000 in the Bay Area and Santa Clara Valley.

Labor Force Cost. Since many high-technology manufacturers are labor intensive, labor force costs are naturally a consideration in the location of industry. In a 1980 employer survey conducted jointly by the Sacramento Metropolitan Chamber of Commerce, City of Sacramento, and County of Sacramento, only 27% of industrial employers rated high labor costs as a problem in Sacramento County. Furthermore, it was clarified that in certain cases where labor costs are high in Sacramento compared with the state average, the productivity of the worker is also higher than the state average. Case in point: While production worker wages are 7% higher than the state average, the value added per manhour in manufacturing is 21% higher than the state average. This high productivity results in unit labor costs 12% below California's average.

Labor Availability. High-tech industries which require a large force of skilled labor may find the market in Sacramento to be somewhat limited. Competition for skilled labor in the Sacramento region is intense according to an industrial survey conducted by the Sacramento Metropolitan Chamber of Commerce. However, this situation is

not unique to Sacramento, but rather it is a situation which prevails in all large metropolitan areas of the state.

In addition, many high-tech industries require large numbers of unskilled and semiskilled workers for production and assembly purposes. In the same industrial survey, there was determined to be a relatively-large pool of unskilled and semiskilled workers available for employment in the Sacramento area.

Quality of Primary and Secondary Schools. In comparing the four major school districts in Sacramento County to the state as a whole, three of the districts fare better than the state median for test scores in primary and secondary schools. Comparatively, the fourth school district was slightly under the state median test scores. Therefore, Sacramento County ranks well in the area of quality of primary and secondary schools, at least based on test scores.

Availability of Transportation. The Brown and Caldwell survey revealed that 68% of the responding firms prefer to be located within 1-1/2 miles of the nearest major freeway or highway access, while 30% of the firms expressed no maximum distance requirements.

Most of the major industrial tracts in Sacramento meet this requirement. In addition, Sacramento provides

a. Direct north-south and east-west interstate highway access via I-5 and I-80;

b. Direct north-south and east-west rail access via Southern Pacific and Western Pacific freight and Amtrak passenger facilities;

c. General aviation and commercial air transport services via Executive and Metro Airports;

d. Ocean transport and shipping services via the Port of Sacramento and Sacramento-Yolo Deep Water Channel; and

e. Trucking services provided by over 1,000 carriers serving the area.

Proximity to Airport with Convenient Flight Schedules. Brown and Caldwell's survey suggests that slightly more than half the responding high-tech firms require a location within thirty minutes travel time from the nearest major air terminal. With the exception of the Hazel-Folsom and McDonnell-Douglas industrial areas, all major industrial tracts are within or close to a thirty-minute drive to Metro Airport under existing traffic conditions.

College and University Research and Training Capabilities. A factor not to be overlooked in the location of high-tech industry is the location's proximity to colleges and universities with the capabilities of training recruitable graduates as well as conducting applicable research. This is particularly important in the fields of engineering, computer science and business administration.

Sacramento rated highly in this area in a recent survey conducted by Reel/Grobman, a Los Angeles firm which specializes in industrial engineering and master planning. This is justified because of California State University at Sacramento's achievements in these areas and the University of California at Davis and its programs.

E. A HIGH-TREND ESTIMATE FOR JOB GROWTH IN THE REGION

1. The Magnitude of a High-Technology Boom

The qualitative attributes which make Sacramento a competitor for high-technology jobs do not necessarily lend themselves to a quantification of how many jobs the region might successfully capture, and any attempt to do so must be regarded with a questioning eye at least equal to the speculative gaze whereby they were divined. So it is with McDonald and Associates, who have , at the behest of the City of Sacramento, developed a high-trend projection for employment growth, assuming that the Sacramento region will be able to attract a significant share of new high-technology jobs.

The underlying rationale for their projection is explained in their recently-released report:

"Higher Statewide Growth in High-Technology. Current projections, based on recent short-term downward trends in the industry, may underestimate the potential mushrooming of this dynamic industry.

Attractive Land Available Within the Sacramento SMSA. Sacramento already represents a desirable location, with good transportation access to major markets. The availability of large industrial sites could further spur high-technology growth in this region.

Attractive Employment Base in the Sacramento SMSA. The region has a large untapped reservoir of employees, many of whom could serve in an expanded high-technology industry. The region also offers good potential for housing and other services for new employees to move into the area."

McDonald & Associates estimates that these factors could lead to an additional 25,700 high-technology jobs in the region. This assumes a 34.4% capture rate of all new high-technology jobs projected for California by the Center for the Continuing Study of California's Economy, and 8.8% of all new national jobs. It represents 20% of all new jobs created in the region during the 1980's--equal to retail and service sector growth. By 1990, the high-technology sector would employ 6.7% of all the region's workers, compared to virtually none now.

This represents a very optimistic estimate given the increasing tendency of the dominent electronics firms to disperse in all directions from their geographical genesis amidst strong competition from numerous other locales, not the least of which is Japan.

2. Impact on Total Employment Growth

Translating 25,700 additional high-technology jobs to total employment growth requires use of a multiplier, an elusive number which defies accurate pinpointing. Prior attempts to describe a multiplier for the Sacramento region have yielded numbers from 2.16 to 2.95, but have all suffered from serious limitations and have tended to overstate the impact (see Appendix 1). Consequently, McDonald & Associates developed their own input/output model specifically for Sacramento County. This model yielded a multiplier of 1.71; that is, .71 jobs created elsewhere in the economy for every new high-technology job. It is based on a county model and consequently would be slightly higher if extended to the region, since Sacramento County imports some goods and services from Placer and Yolo Counties. A multiplier of 1.71 is still well under that of other recent studies, but it must be remembered that the consultants are using it only to predict secondary growth assiciated with an added increment of basic jobs in one industry after other expansionary factors in the economy have been accounted for in the existing trend projection. Although time constraints and our unfamiliarity with the mechanics of input/output models prevent rigorous evaluation of its validity, the relationship appears to be a defensible one.

TABLE 10

HIGH TREND ESTIMATE OF WAGE AND SALARY EMPLOYMENT IN SACRAMENTO SMSA

1980-1990

(in 1000's)

	SECTOR	(1) EXISTING TREND 1990	(2) ADDITIONAL HIGH-TECH STIMULATED INCREMENT	(3) HIGH TREND 1990	1980-90 HIGH-TREND INCREASE
CONVENTIONALLY BASIC	Agriculture	10.1	- 0.2	9.9	0.8
	Mining	0.6	0	0.6	0.1
	Durable Goods Manufacturing	31.1	26.0	57.1	42.9
	Nondurable Goods Manufacturing	17.3	0.2	17.5	4.5
	State and Federal Government	95.6	0	95.6	7.1
		154.7	26.0	180.7	55.4
CONVENTIONALLY NON-BASIC	Construction	26.8	2.7	29.5	10.2
	Transportation and Utilities	32.4	2.1	34.5	12.8
	Retail Trade	118.0	3.4	121.4	44.9
	Wholesale Trade	25.3	1.5	26.8	9.4
	FIRE	47.7	1.7	49.4	27.1
	Services	110.3	7.4	117.7	44.3
	Local Government	58.6	0.5	59.1	6.5
		419.1	19.3	438.4	155.2
	TOTAL WAGE AND SALARY	573.8	45.3	619.1	210.6

(1) From Table 3, page _____.

(2) SOURCE: Angus McDonald & Associates and George S. Nolte & Associates; Sacramento Area Employment And Land Use Projections; January 1982.

(3) The additional increment associated with high-tech growth has been applied to the existing trend projection developed in this report, which differs slightly from the existing trend projection in the McDonald report. Consequently, the high-trend employment differs slightly from that in the McDonald report.

A point that should be kept in mind when considering secondary induced growth is that it does not occur instantaneously when basic jobs are added. It may be a couple of years before the ripple effect of a given increment of basic job growth is felt through the whole economy. Since high-technology job increases in the late 1980's may be substantial, their impact will not entirely be felt by the time of our 1990 horizon.

Table 10 shows the effect of enhanced growth in the high-technology field on employment in all sectors, as projected by McDonald & Associates. Distribution among sectors for the existing trend projection was slightly different from that in Table 3 of this report and has been adjusted to match the latter. Total employment in the high-trend scenario would amount to 619,000, an increase of 210,600. This is 45,300 more jobs than the existing trend projection. Most of the secondary job increase would fall in the service sector (7,400) and retail trade sector (3,400), with minor increases in other sectors.

IV
RELATIONSHIPS BETWEEN EMPLOYMENT, POPULATION, AND HOUSEHOLDS

There has been an unfortunate tendency in many jurisdictions over past years to plan for one particular aspect of growth in the community without giving due consideration to other determinants of that growth. The relationship between population and job projections is one example. Most agencies in California use population projections developed by the State Department of Finance to prepare their general plans and housing programs. These projections are based on statewide fertility and immigration rates disaggregated by county according to recent trends in local growth. They do not incorporate projected growth in employment, which fundamentally influences the rate in which a region grows. On the other hand, those involved primarily with employment development tend to give inadequate attention to an area's ability to efficiently and cost-effectively provide for the resulting housing and government services. When these needs are not adequately met, they ultimately reduce employment development opportunities. This section of the report discusses linkages between employment and population, with the hope of providing a better overall understanding of growth determinants.

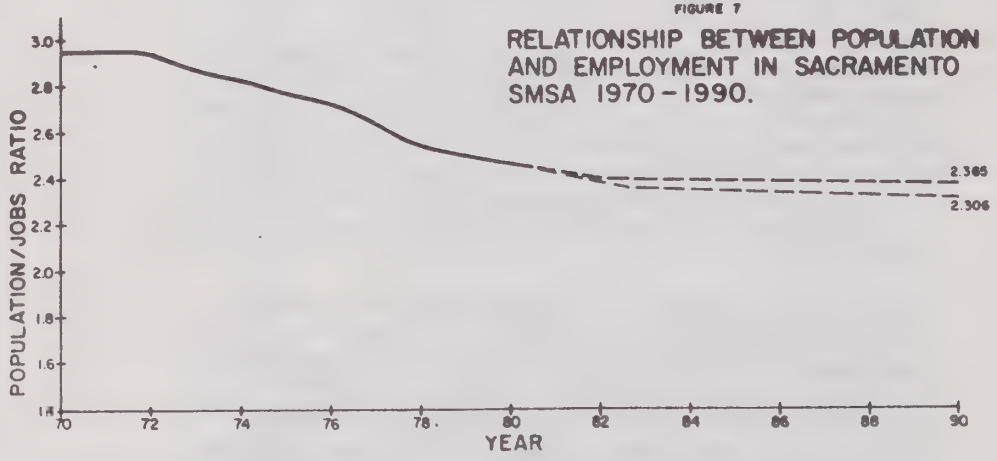
A. THE POPULATION/JOBS RATIO

The population/jobs ratio is the most direct and easily-measured way to relate employment and population. The jobs/household ratio is another commonly-used measurement. However, accurate household data is only available in census years. The ratio for the region for 1970, 1975, and 1980 has been nearly constant at about 1.1. Although the number of wage earners in many households has increased, they have been offset by new household formations and a decreasing household size. This masking affect makes it more informative to utilize the population/jobs ratio to calculate population and then convert to households utilizing a household size factor. The State Department of Finance and State Employment Development Department make reliable annual estimates of population and employment data, enabling an accurate plotting of past trends. Figure 7 plots the calculated population/jobs ratio for each year between 1970 and 1980. The employment data used in these calculations represents wage and salaried workers by place of work. Using total employed persons to calculate the ratio would lower the overall ratio, although its rate of decline would be about the same. Wage and salary worker data were used because the employment projections developed in the previous section include only wage and salary workers.

An important assumption in calculating this ratio is that the relative number of persons residing outside the region and commuting to jobs in the Sacramento SMSA compared to persons who commute from the SMSA to jobs outside the region has remained about the same over the 10-year period. Data from the 1980 Census

FIGURE 7

RELATIONSHIP BETWEEN POPULATION AND EMPLOYMENT IN SACRAMENTO SMSA 1970 - 1990.



SOURCE: STATE E.D.D. EMPLOYMENT DATA AND D.O.F. CERTIFIED POPULATION ESTIMATES

verifying this assumption are as yet unavailable, but it does not appear that any significant changes in interregional commute patterns have developed since the 1970 Census, when incommuters nearly equalled outcommuters.

Figure 7 shows a large drop in the population/jobs ratio over the 10-year period from 2.95 to 2.48. This means that in 1970, two out of six people in the region were wage and salary employees, and by 1980, the ratio had dropped to two out of five people. The significance of this decline is demonstrated by the fact that if the ratio had remained constant, and the same number of new jobs had been created during the decade, the region's total population would be 185,000 higher than it actually was in 1980.

There are two principal reasons why the ratio has dropped so significantly. First is the large number of new entrants to the labor force during the decade as the post-world-war baby boom came of age. These new workers competed for available jobs and reduced the need to hire persons from outside the region. At the same time, this age group was producing fewer children, so that the overall percentage of population 16 years and older increased 8 points from 68.7% to 76.7%.

The second reason is the increase in labor force participation by those old enough to work. This can be primarily attributed to increased numbers of second wage earners in households entering the labor force. We have calculated that the labor force participation rate increased by 3.9% during the 1970's (see Appendix 3), reflecting an additional 27,400 persons in the work force.

It is not likely that the population to jobs ratio will drop anywhere near as much in the 1980's as it did during the previous decade. If it did, we would be approaching a ratio of one job for every two persons, which is difficult to envision. Projections of population age distribution by 1990 show virtually no change in the percentage of persons 16 years and older. The number of persons reaching 16 will balance the number of newborn and young immigrants during the period. The comparatively fewer first-time workers will mean that immigration will increase as new jobs are filled by those from outside the region.

The increase in labor force participation rate will continue, however, to follow the trends set in the late 1970's, although it may fall off in the late 1980's. According to Security Pacific National Bank in its recent report on Central California:

> "The drop in the number of young people seeking their first jobs, coupled with a levelling-off, by 1985, of female participation in the work force, should cause labor force growth to slow in the 1980's--probably enabling reduction in unemployment."

With respect to older persons, the report adds:

> "Conflicting trends are expected to influence the outlook for labor force participation among persons over 55 years of age. While some workers will opt for early retirement, modifications to structured work patterns, such as job sharing and part-time employment--along with the difficulties of living on fixed retirement incomes--may result in increased labor force participation among older workers."

B. PROJECTED POPULATION/JOB RATIOS IN 1990

Because it is not possible to accurately predict the variables which determine the population/job ratio and even slight variations in the ratio can significantly change the total population projected from employment gains, we have developed two alternative population/job trend lines for 1990. The first is derived from the projections of the Center for the Continuing Study of California's Economy, which relies on a computer program incorporating age distribution characteristics, extent of moonlighting, unemployment rates, and labor force participation rates to translate total jobs into population. For the Sacramento SMSA, the Center

projects a population/jobs ratio of 2.365. To develop a second alternative, we assumed an age distribution factor of .76825,* almost identical to the distribution for 1980 (see Appendix 3); a labor force participation rate of 3.9%, the same increase that occurred during the 1970's; and an unemployment rate of 7%. This works out to a population/jobs ratio of 2.306.

C. HOUSEHOLD SIZE

Given a certain population increase, the number of new households can be estimated by factoring out persons living in group quarters (institutionalized persons, convalescent home residents, etc.) and dividing by the average household size. In 1980, total population living in households in the region was estimated by the State Department of Finance to be 97.6% of the total civilian population, and we have assumed that this percentage will hold through 1990. The Department of Finance also estimates that average household sizes in each of the region's three counties will drop considerably by 1990:

	1980 Average Household Size	1990 Average Household Size
Sacramento	2.56	2.40
Placer	2.71	2.55
Yolo	2.59	2.47

The weighted average of these three figures is 2.434.

The causes of this projected decline include long-term demographic trends associated with the aging of those that constitute the post war baby bulge in the population, their establishment of new households, and their preference for fewer children. It is possible that continued increases in housing costs over the next ten years could force enough individuals to group together in larger households to reduce the decline in average household size slightly. It may also be possible that the Sacramento region's shift away from a government-dominated economy during the 1980's will cause Sacramento's household size to more closely approximate that of other major California urban counties (which were typically .1 to .2 higher than Sacramento in 1980). At this time, however, data is insufficient to support these hypotheses.

*Based on E150 series projections of age distribution in 1990 developed by the Department of Finance in 1977.

D. EMPLOYMENT-BASED POPULATION AND HOUSEHOLD PROJECTIONS

The population and household increases associated with various employment growth projections are summarized in Table 11. Both high- and low-range figures are given, based on different assumptions regarding labor force participation and unemployment rates. Even the slight variations in these assumptions yield about a 35,000 difference in population.

TABLE 11
1990 POPULATION AND HOUSEHOLD PROJECTIONS
BASED ON ALTERNATIVE EMPLOYMENT GROWTH TRENDS
SACRAMENTO SMSA

EMPLOYMENT INCREASE (in 1000's)	BASIS OF PROJECTION	(1) POPULATION INCREASE (in 1000's)	(2) HOUSEHOLD INCREASE (in 1000's)
125	Center for Continuing Study of California's Economy	216 248	103 116
145	Existing Trends Adjusted to Reflect Slowdown in Service-Sector Growth (4)	262 295	121 135
165	Existing Trends	308 342	140 153
193	Adjusted Existing Trends Plus Rapid High-Tech Growth (3)	373 409	166 180
213	Existing Trends Plus Rapid High-Tech Growth (3)	419 456	184 199

(1) High projection based on population/jobs ratio of 2.365. Low projections based on population/jobs ratio of 2.306. 1980 population = 1,014,000.
(2) Based on weighted average household size of 2.434 for Sacramento SMSA, 2.4% of population in group quarters, and 1980 occupied households of 390,400.
(3) Based on additional 25,700 high-technology jobs and 45,300 additional total high-trend projection developed by Angus McDonald Associates for Sacramento City.
(4) Corresponds to most recent State Department of Finance projection of 285,000 population increase for the region.

In comparing these numbers, it is useful to keep in mind the most recent regionwide population projections by the State Department of Finance: a 285,000 increase in population by 1990 to 1,299,000. This number corresponds to an employment increase in the vicinity of 145,000, which we believe is the most probable direction that existing trends will take us, given a likely drop-off in service sector growth. If service sector employment gains do keep pace with the 1970's, we can expect population increases exceeding 300,000. And if a substantial acceleration of high-technology jobs beyond what we already expect occurs, then the increase could swell to 370-400,000 people, who will need up to 200,000 homes. At seven units per acre, that is 44 square miles of solid residential development.

The obvious questions raised in contemplating these high-trend projections include: Where are we going to put that many new homes? Can we build them fast enough to meet demand? And, can they be sold at prices which people can not only afford to buy but be willing to migrate to the area to occupy a new job in the first place? At some point in time, somehow, the previously-mentioned feedback mechanism relative to housing and employment--not to mention the disincentives of major traffic congestion, crime, air quality, etc.--will come into play, companies will choose other locations that are not suffering from adverse consequences of too rapid growth, and the rate of basic job growth will de-accelerate. This equilibrating effect, plus the time lag associated with secondary growth from a high-tech boom and the overly-optimistic capture rates associated with the high-trend projection, make it unlikely that the upper limits of these projection ranges will be attained.

The challenge facing the region, we are told, is to recognize the problems faced by Santa Clara and Orange Counties in similar situations, and confront them boldly with well-conceived plans and programs.

V
INDUSTRIAL LAND DEMAND

Employment growth trends indicate that during the decade of the 1980's, the number of workers in the Sacramento SMSA will increase by about 165,000, including 21,200 new manufacturing employees. Historically, 80% of the three county region's jobs have been located in the Sacramento jurisdictions (55% in the City of Sacramento and 25% in the rest of Sacramento County). Where the jobs that develop during the 1980's will be located is an important issue. This section focuses on where the expected new manufacturing jobs might be located.

A. DEMAND PROJECTION METHODS

There are two basic approaches to projecting the amount of land required to meet the future demand created by industrial development. One is to extrapolate past trends of industrial land absorption. The other is to calculate how much land would be needed to accommodate projected levels of new industrial employment with some assumptions about the average density of employment. Both approaches require information about what mix of uses (including nonindustrial activities) is occupying the industrial land being absorbed.

B. CURRENT USE OF SACRAMENTO'S INDUSTRIAL LAND

The only good quantitative data available that reveals past trends in industrial land use for the Sacramento region is an annually-updated industrial land use survey begun in 1975 by the Sacramento County Planning Department and limited to industrial areas in unincorporated Sacramento County and the Cities of Sacramento, Folsom, and Galt. The inventory of industrial land use in these Sacramento jurisdictions includes about 6,500 acres of developed, occupied industrial land located within the County's urban policy area. About 5,300 acres of this developed industrial land is located in industrial areas considered to have prime or good potential for further industrial development. Of this 5,300 acres, only 940 acres (18%) is used for manufacturing activities. About 44% of the developed industrial land in these prime and good potential areas, or some 2,880 acres, is used for various nonmanufacturing industrial uses, including warehousing/distribution, building materials yards, construction contractor yards, and auto wrecking yards. Another 13% is used for transportation, communications, and utilities (TCU) purposes, including such activities as trucking operations, railroad yards, telephone maintenance yards, electrical transmission and maintenance facilities, and so on. About 15% of the land is used for a variety of office, retail, hotel-motel, restaurant, service business, and residential purposes. Surface mining for construction aggregate (sand and gravel) accounts for 10% of the land. Table 12 shows the use characteristics of each industrial area and Figure 8 illustrates the share of the developed industrial land that each use category represents.

This mix of uses on industrial land in Sacramento is not surprising given the nature of our labor force. Other than food processing operations, the Sacramento regional economy historically has not included many enterprises that make intensive use of industrial land. Even Sacramento's largest manufacturing employer, Aerojet General, at its peak job level of the 1960's employed almost 20,000 people on 8,360 acres or only 2.4 employees/acre. Relatively cheap industrial land has been utilized by companies representing a wide range of economic activities besides manufacturing. During the 1970's, the Sacramento jurisdictions absorbed the growth of 3,500 manufacturing jobs, 3,100 transportation utilities jobs, 5,800 construction jobs, and 5,200 wholesale trade jobs. Almost all the manufacturing job growth and most of the wholesale trade job growth occurred on

industrial land. The growth in transportation and utilities and construction employment resulted in significant new use of industrial land for maintenance yards, trucking operations, and contractor's equipment yards and offices. The most common structure built on industrial land in Sacramento during the 1970's was a warehouse for tenants engaged in wholesale distribution. Data for a sample of warehouse-distribution firms located in a typical warehousing district, the Florin-Perkins area, indicate an average employment density of 7.5 workers per acre. As we shall see, this is about half the average employment density of manufacturing operations in Sacramento and suggests that the growth of warehouse-distribution activities during the 1970's probably consumed almost three times as much industrial land as the growth of manufacturing activities.

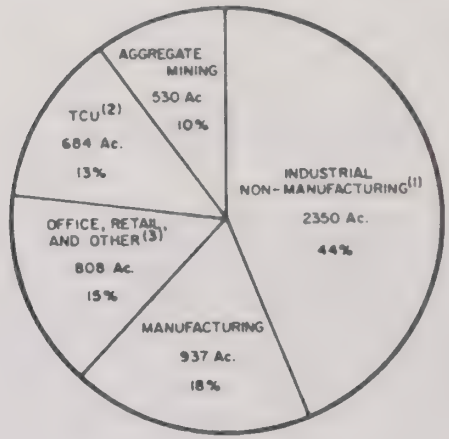
TABLE 12
1980 INDUSTRIAL LAND USE IN SACRAMENTO
(Figures in acres)

INDUSTRIAL CATEGORY/AREA	DEVELOPED LAND: NON-MFG (1)	MFG.	T, C, U	OTHER	TOTAL	VACANT LAND: TOTAL
Prime						
Sunrise	257 (2)	33	18	58	366	1,444
Northgate-Norwood	125	27	16	25	193	734
Florin-Perkins	1,607	337	79	301	2,324	1,684
Bradshaw	126	46	0	58	230	498
South Florin	55	91	4	7	157	258
Subtotal	2,170	534	117	449	3,270	4,618
Good Potential						
Hazel-Folsom	41	50	2	10	103	678
Elk Grove	80	111	30	7	228	648
Antelope	77	0	189	0	266	319
Richards Blvd.	191	123	311	96	721	104
Woodlake-Arden	169	24	13	134	340	168
El Camino-Marconi	33	11	7	25	76	105
Roseville Rd.	121	19	15	74	229	136
West of McClellan	0	0	0	13	13	524
McDonnell-Douglas	0	65	0	0	65	3,790
Subtotal	712	403	567	359	2,041	6,472
Minimal Exp. Potential						
Subtotal	322	223	313	401	1,259	3,079
Totals and Percentages for Prime and Good Potential Land	2,882 54%	937 18%	684 13%	808 15%	5,311 100%	11,090
Totals and Percentages for All Developed Industrial Land	3,204 49%	1,160 18%	997 15%	1,209 18%	6,570 100%	14,169

(1) Includes aggregate mining.

(2) Does not include the 74-acre shooting range at Sunrise and Douglas Road zoned M-1 and owned by the Cordova Recreation and Park District.

FIGURE 8
USE CHARACTERISTICS OF SACRAMENTO'S OCCUPIED INDUSTRIAL LAND: PRIME AND GOOD DEVELOPMENT POTENTIAL AREAS - 1980



C. FUTURE USE OF SACRAMENTO'S INDUSTRIAL LAND

As the employment growth projections for the 1980's suggest, this dominance of nonmanufacturing activity growth as a user of new industrial sites is not likely to continue. During the 1980's, the Sacramento region is likely to absorb the growth of 21,200 manufacturing jobs, 7,900 wholesale trade jobs, 10,700 transportation and utilities jobs, and 7,500 construction jobs. As Figure 9 shows, the growth of manufacturing activities including high-technology enterprises is likely to account for perhaps one-quarter of the vacant industrial land absorbed during the 1980's. Growth of wholesale-distribution and construction-related activities will

probably consume over one-third of the new industrial land to be used. No additional aggregate mining on land classified as having prime or good development potential is expected, with most of this activity moving into the Vineyard and Rancho Cordova communities south of Mather Air Force Base. The need for industrial land generated by growth in the transportation and utility sector will probably amount to less than 10% of the land required. The increasing demand for industrial office space by firms engaged in the service sector of the economy and for "showroom warehouse" retail space by home furnishing and similar retail trade enterprises will account for about one-quarter of the new industrial land absorbed. The high-growth trend projections, although considered unlikely to be achieved, would result in a higher share of industrial land absorption for manufacturing activities and a lower share for warehousing, offices, and other nonmanufacturing uses as shown in Figure 10. The distribution of uses for industrial land under the two employment growth trend projections represent reasonable guesses for developing alternative demand estimates.

FIGURE 10

HIGH GROWTH TREND FORECAST USES FOR SACRAMENTO INDUSTRIAL LAND DEVELOPING DURING THE 1980'S

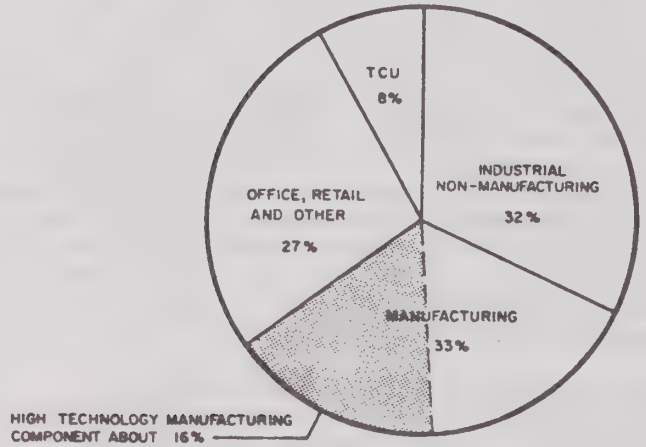
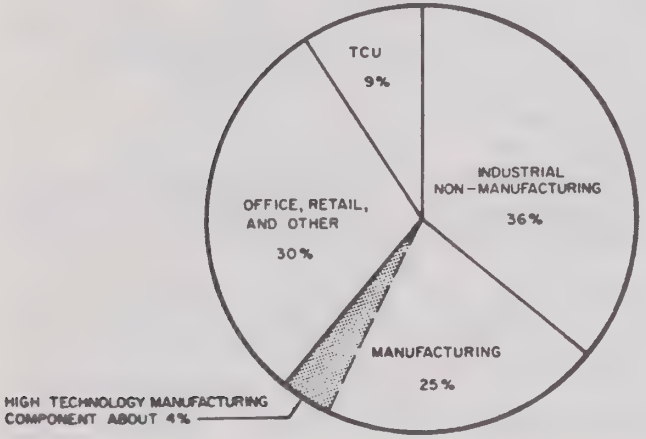


FIGURE 9

EXISTING TREND FORECAST USES FOR SACRAMENTO INDUSTRIAL LAND DEVELOPING DURING THE 1980'S



There has been a growing tendency for zoned industrial land to be used for office and other commercial uses. The City of Sacramento places few restrictions on such users of industrial land. The County of Sacramento allows unlimited office use in the MP-Industrial Office Park zone which is being sought more frequently now by developers of vacant industrial land. To assure an adequate supply of land for the anticipated influx of high-technology manufacturing firms to the region and the County, it will be important to keep track of how much developing industrial-zoned land is consumed by office and other nonindustrial uses.

D. SACRAMENTO'S CURRENT MANUFACTURING EMPLOYMENT DENSITY

An estimate of the density of employment (workers per acre) for manufacturing businesses currently located in the Sacramento jurisdictions can be derived from EDD employment figures for 1980 and the land use data presented above. In 1980 within Sacramento County, there were about 20,000 manufacturing jobs. Subtracting 3,500 for Aerojet-General, about 1,500 for Campbell's Soup, and another 1,000 for other employers located in the minimal expansion potential industrial areas, leaves an estimated 14,000 manufacturing employees. These jobs are with enterprises located on the 940 acres of land in the prime and good potential industrial areas shown by survey to be used for manufacturing purposes. These two figures represent an average density of 14.9 employees per acre.

Such a density level for local manufacturing is further supported by data on employment and parcel size derived from industrial employer surveys conducted in 1979 by the Sacramento County Office of Economic Development, the Sacramento City Planning Department, and the Metropolitan Chamber of Commerce; the Manufacturer's Directory; and the County's industrial land use inventory. Data for 86 Sacramento manufacturers representing 14 different major manufacturing categories and employing a total of 10,600 employees (over half of Sacramento's total manufacturing workers) indicate an average employment density of 14.5 workers per acre (see Table 13 for this and comparative data). Given Sacramento's low-intensity industrial characteristics, this density seems reasonable compared to average manufacturing densities reported in the mid-sixties for Santa Clara County (23.6 workers/acre) and Los Angeles County (31.6 workers/acre). A 1979 figure for 290 acres of industrial parks in San Diego County serving employers with over 9,100 workers is 31.6 employees per acre.

TABLE 13
MANUFACTURING EMPLOYMENT DENSITY
(Figures represent employees/area)

STANDARD INDUSTRIAL CLASSIFICATION	SACRAMENTO-1980		SANTA CLARA-1965	LOS ANGELES-1966	NATIONAL SURVEY-1970
Non-Durables					
20 - Food and Kindred Products	20.5	(16)*	17.0	45.9	19.3
26 - Paper and Allied Products	7.3	(1)			
27 - Printing and Publishing	132.9	(3)	83.3	113.6	51.3
28 - Chemicals and Allied Products	5.3	(6)	8.0	14.6	7.9
30 - Rubber and Plastic Products	17.3	(4)	39.4	21.6	20.2
Durables					
24 - Lumber and Wood Products	8.0	(20)	12.6	35.3	22.4
25 - Furniture and Fixtures	22.8	(5)	30.9	35.8	35.1
32 - Stone, Clay, Glass, Concrete	5.6	(5)	5.4	6.5	5.8
33 - Primary Metal Industries	12.4	(2)	53.4	—	20.7
34 - Fabricated Metal Products	15.5	(11)	14.6	29.2	9.6
35 - Machinery, exc. Electrical	15.5	(6)	27.0	30.1	9.4
36 - Electrical and Electronic Machinery, Equip., Supplies	32.3	(1)	42.9	55.8	54.3
37 - Transportation Equip.	13.2	(4)	16.2	57.2	29.8
38 - Instruments, Photographic, Medical, Optical	31.3	(2)	76.3	40.0	59.6
Average	14.5	(86)	23.6	31.6	—

*Numbers in parentheses are the number of Sacramento firms in each category for which data was available.
SOURCES: Highway 66 Bypass Study: Industrial Density Section, and Sacramento County Planning Department

E. SACRAMENTO'S FUTURE MANUFACTURING EMPLOYMENT DENSITY

The roster of existing users of Sacramento's industrial land assures that the overall pattern of use will not shift very rapidly. However, the businesses which locate, for the most part, on currently-vacant industrial land during the 1980's will reflect a mix of uses that is more intense and more often manufacturing. As we have seen, manufacturing is expected to contribute a much larger share of the region's job growth during the 1980's than it did in the 1970's. Since the majority of new manufacturing jobs will be in high-technology-oriented firms, it is necessary to look at the density characteristics of high-tech manufacturing to forecast the average density for Sacramento's manufacturing employment growth of the 1980's.

As the comparative density data in Table 13 shows, those durable goods manufacturing categories which include large shares of high-tech activities (SIC 36 - Electrical and Electronic Machinery and Components and SIC 38 - Instruments, etc.) tend to have higher than average manufacturing employment densities. Specific

1979 employment density figures for eight high-tech manufacturing firms located in the City of Sunnyvale in Santa Clara's Silicon Valley are shown in Table 14. Most of the eight firms have multiple shift schedules. The number of employees per acre during the largest shift averages over 42 for these companies. More important, however, for determining the land requirement for the total employment of the 8 firms is the overall employment density disregarding shifts. These firms employed 12,550 workers on 183 acres for an average overall density of 68.5 jobs per acre.

Industrial land is in relatively short supply in the Santa Clara Valley, which is reflected in per square foot land prices 3 to 5 times as much as in the Sacramento region. One might expect that the employment density of high-technology manufacturing that develops in the Sacramento region would be somewhat lower than in the Santa Clara area. A look at the plans of three electronics firms locating in Placer County and another five high-tech manufacturing firms locating in Sacramento County shows an expected overall employment density of 38 to 40 workers per acre (see Table 15). The Sacramento group alone actually averages 41 to 45 workers per acre. For comparison, the employment density of lowrise suburban office parks like Point West, Campus Commons, and the proposed Natomas area business parks on Interstate 5 (Natomas Eastside and Gateway Center) ranges from about 50 to 80 employees per acre. Although zoned land is in abundant supply, industrial land prices in the Sacramento area have been increasing at a dramatic rate. Given a financial incentive for more intensive use of industrial land, it appears reasonable to assume that high-tech manufacturing operations locating in Sacramento during the 1980's will have an average density of at least 40 workers per acre. Growth in other durable goods manufacturing as well as nondurable goods manufacturing can be conservatively expected to attain Sacramento's 1980 average manufacturing density of 15 workers per acre. At these component densities, the manufacturing job growth forecast with the existing trend projection will absorb land at an average employment density of over 23 jobs per acre. At the same component densities, the manufacturing job growth projected under the high growth trend projection will consume land at an average density of almost 30 jobs per acre as new high-tech jobs would outpace other manufacturing jobs by 2.6 to 1.

TABLE 14
1979 EMPLOYMENT DENSITY FOR HIGH-TECH MANUFACTURING IN THE CITY OF SUNNYVALE

FIRM	TOTAL EMPLOYEES	LARGEST SHIFT	ACRES	TOTAL JOBS/ACRE	LARGEST SHIFT JOBS/ACRE
Boschert	341.	303	4.6	74.1	65.6
ESL	1,727	1,727	27.9	61.9	61.9
Advanced Microdevices	3,000	1,200	23.6	127.1	50.8
California Microdevices	865	433	14.6	59.2	29.7
Amdahl	1,200	924	39.4	30.5	23.5
Singer Link	770	724	9.9	77.8	73.1
Applied Technology	650	455	10.8	60.2	42.1
Signetics	4,000	2,000	52.5	76.2	38.1
TOTAL	12,553	7,766	183.3	68.5	42.4

SOURCE: Adapted from Highway 65 Bypass Study: Industrial Density Section, Sunnyvale data compiled February, 1980.

TABLE 15
EXPECTED HIGH-TECH EMPLOYMENT DENSITY FOR MAJOR SACRAMENTO REGION FIRMS

FIRM	PLANNED EMPLOYEES	PLANNED FLOORSPACE	JOBS/1000 SF	PARCEL SIZE	JOBS/ACRE
Hewlett-Packard Roseville	1st phase: 5,000	1,360,000 SF	3.7	125.0 ac.	40
Shugart Associates Roseville	2,000 - 2,500	320,000 SF	6.3 - 7.8	30.0 ac.	67 - 83
Electronic Arrays Div.-NEC Electronics Roseville	3rd phase: 1,500	300,000 SF	5.0	75.0 ac.	20
Signetics Northgate-880 IP	1st phase: 425	82,000 SF	5.2	6.4 ac.	66
Progressive Circuit Products Norwood IP	1st phase: 125	22,000 SF	5.7	4.5 ac.	28
Franklin Electric Co. Prospect BP	350	100,000 SF	3.5	10.0 ac.	35
Second Foundation Prospect BP	300	89,000 SF	3.3	7.2 ac.	42
Cable Data Prospect BP	2nd phase: 800 - 1,000	240,000 - 300,000 SF	3.0	21.0 ac.	38 - 48
Roseville Group	8,500 - 9,000	1,980,000	4.3 - 4.5	230.0 ac.	27 - 39
Sacramento Group	2,000 - 2,200	533,000 - 593,000 SF	3.7 - 3.8	49.1 ac.	41 - 45
TOTALS	10,500 - 11,200	2,513,000 - 2,573,000 SF	4.2 - 4.4	279.1 ac.	38 - 40

F. DEMAND FORECAST BASED ON EMPLOYMENT PROJECTIONS

To estimate the demand for industrial land in the Sacramento jurisdictions during the 1980's resulting from manufacturing growth we must estimate the share of the regional manufacturing employment growth likely to locate within Sacramento County. Suggested scenarios for the distribution of the manufacturing employment growth over the decade between Sacramento, Placer, and Yolo Counties are presented in Table 16 for both the existing trend and high-growth trend projections.

Assumptions about the rate of Placer County high-tech manufacturing job growth are essential to the derivation of these scenarios since Roseville is the location of the three largest high-tech operations yet announced for the region, and because Placer County's capacity to absorb additional manufacturing growth during this decade is severely limited. The existing trend scenario assumes that the Highway 65 Bypass will be built during the latter half of the 1980's allowing Hewlett-Packard to reach its full 1st phase employment of 5,000 workers by 1990. The high-growth trend scenario assumes that the only way the region might possibly reach the 37,700 high-tech job level by 1990 is for Hewlett-Packard to have reached its full 2nd phase employment of 10,000 workers by 1990. Additional traffic from growing Hewlett-Packard 2nd phase operations would require that the Bypass be completed by shortly after mid-decade.

The commercial real estate firm of Coldwell Banker, in its annual forecast in January 1982, predicted that, "There will be no boom of 'high-tech' companies in Placer County, mainly because of utility problems. Placer does not have the capacity to attract many more of the larger electronics companies but will experience controlled growth. Sacramento County will receive most of the light industry." As a result, even under the high-growth trend scenario, we suggest that besides the Hewlett-Packard, Shugart, and NEC jobs, Placer County will attract enterprises with no more than 3,000 additional high-tech jobs by 1990. These and other characteristics of each County's industrial land base utilized in preparing the two scenarios are discussed in more detail in the next chapter.

TABLE 16
ALTERNATIVE MANUFACTURING EMPLOYMENT GROWTH SCENARIOS FOR 1990

Numbers represent jobs gained between 1980 and 1990. Alternatives are described further in the employment projections chapter.

(1) EXISTING TREND	SMSA TOTAL	SACRAMENTO COUNTY	PLACER COUNTY	YOLO COUNTY
High-Tech Mfg	12,000	3,500	8,000	500
Other Durables Mfg	4,900	3,500	600	800
Nondurables Mfg	4,300	3,100	200	1,000
TOTAL MANUFACTURING	21,200	10,100	8,800	2,300
(2) HIGH GROWTH TREND				
High-Tech Mfg	37,700	18,200	17,000	2,500
Other Durables Mfg	5,200	3,800	600	800
Nondurables Mfg	4,500	3,200	200	1,100
TOTAL MANUFACTURING	47,400	25,200	17,800	4,400

(1) Assumes for Placer County that Highway 65 Bypass is under construction by 1986, Hewlett-Packard completes its Phase I with 5,000 jobs, Shugart has 2,000 jobs, NEC has 1,200 jobs, and other Placer high-tech firms have 800 jobs.

(2) Assumes that Highway 65 Bypass construction is completed by 1986, that Hewlett-Packard completes its Phases I and II with 10,000 jobs, Shugart has 2,500 jobs, NEC has 1,500 jobs, and that infrastructure limitations hold other Placer high-tech employment to 3,000 additional jobs.

The new manufacturing jobs locating within Sacramento County under the existing trend scenario total 10,100 jobs. At 40 jobs per acre, the 3,500 high-tech manufacturing jobs included would require sites totaling 88 acres (see Figure 11). At 15 jobs per acre, the 6,600 other durable goods and nondurable goods manufacturing jobs would need 440 acres of land. If this 528 additional acres for manufacturing use represents 25% of the Sacramento industrial land to be absorbed during the 1980's (refer to Figure 9), then a total of 2,112 acres of industrial land would be required. In other words, 528 acres would be used for manufacturing while 1,584 acres (75%) would be used for warehouse-distribution, office, and other nonmanufacturing uses.

The new manufacturing jobs locating within Sacramento County under the high-growth scenario total 25,200 jobs. At 40 jobs per acre, the 18,200 high-tech manufacturing jobs would require 455 acres. At 15 jobs per acre, the 7,000 other durable goods and nondurable goods manufacturing jobs would consume 467 acres. If this 922 additional acres for manufacturing use represents 33% of the Sacramento industrial land to be absorbed during the 1980's (refer to Figure 10), then a total of 2,794 acres of industrial land will be required including 1,872 acres for nonmanufacturing activities.

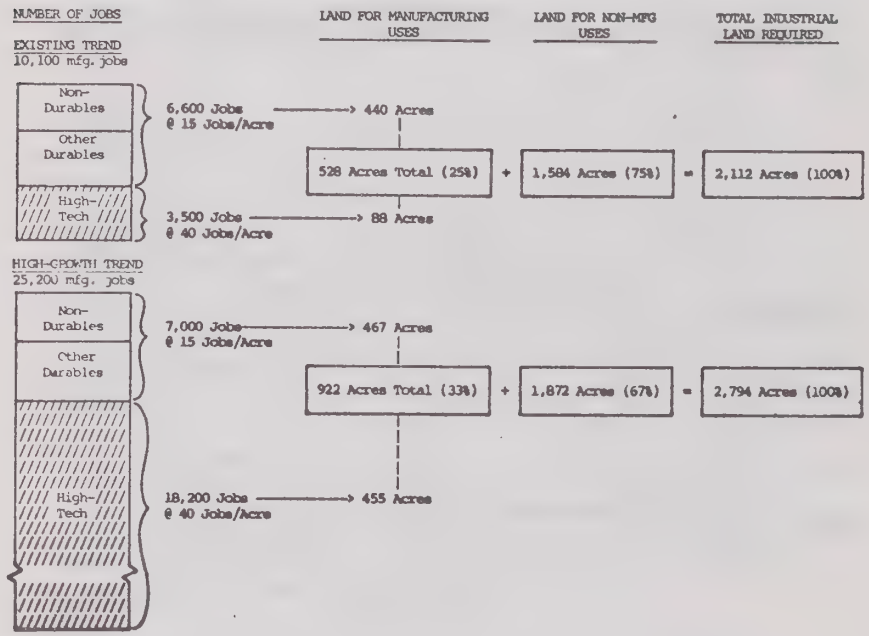
G. DEMAND FORECAST BASED UPON LAND ABSORPTION TRENDS

Since we lack annual industrial land absorption rate data for Placer and Yolo Counties, we again focus on Sacramento County jurisdictions and the use distribution characteristics forecast for industrial expansion during the 1980's (Figures 9 and 10). Alternative rates of industrial land buildout for Sacramento, along with corresponding manufacturing job capacities, are developed in Figure 12 using the following assumptions:

Absorption by construction of zoned industrial land in the Sacramento jurisdictions amounted to 185 acres in 1979 and 250 acres in 1980. These rates are much higher than the estimated average absorption rate for the 1970's of 75 to 100 acres per year. Annual absorption figures for 1981 have not yet been calculated, but 136 acres of industrial land was consumed during the first six months. Coldwell Banker indicates that at the end of 1981, due to booming speculative construction in recent years, there was more than 4.1 million square feet of vacant industrial space available. This is twice as much as at the end of 1980 and has occurred despite tenants occupying 35% more industrial space in 1981 than during 1980. Total new industrial space authorized by issuance of building permits was 3.5 million square feet in 1980 and 1.4 million square feet during the first half of 1981. Coldwell Banker anticipates that speculative industrial construction will decline in 1982, including the postponement of

FIGURE 11
INDUSTRIAL LAND DEMAND IN THE SACRAMENTO JURISDICTIONS
METHOD ONE: 1980-1990 EMPLOYMENT GROWTH FORECASTS

(Existing Trend: 10,000 additional manufacturing jobs in Sacramento County and its cities; High-Growth Trend, 25,200 additional manufacturing jobs in Sacramento County and its cities).



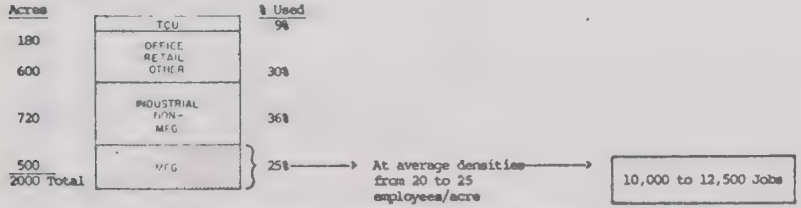
some previously-announced projects. Assuming that industrial land absorption by construction will decline somewhat, at least until the end of the current economic recession, it appears reasonable to forecast an average annual Sacramento industrial land absorption of 250 acres per year through the end of the decade. Such a buildout rate would correspond well with the existing trend scenario for manufacturing employment growth in the Sacramento jurisdictions.

Even with the rapid expansion of manufacturing, especially in the high-tech categories as assumed with the high-growth trend forecast, it seems unlikely that industrial land consumption for the 1980's in the Sacramento jurisdictions could average more than 400

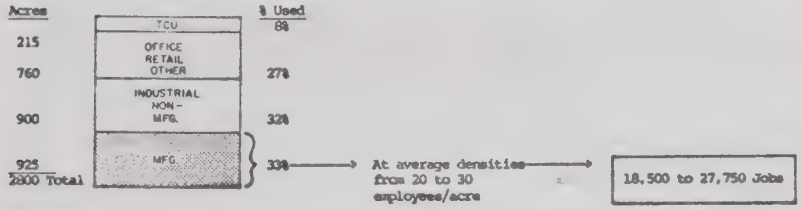
FIGURE 12
INDUSTRIAL LAND DEMAND IN THE SACRAMENTO JURISDICTIONS
METHOD TWO: ABSORPTION TRENDS EXTENDED TO 1990

(Existing Trend: 10,000 additional manufacturing jobs in Sacramento County and its cities; High-Growth Trend, 25,200 additional manufacturing jobs in Sacramento County and its cities).

A. Assuming an average of 250 industrial acres built on each year from 1982 through 1989 (8 years) and the existing trend forecast for utilization of industrial land by manufacturing and other users. See Table 9 for use distribution.



B. Assuming an average of 350 industrial acres built on each year from 1982 through 1989 (8 years) and the High-Growth Trend forecast for utilization of industrial land by manufacturing and other users. See Table 10 for use distribution.



Larger high-tech share of manufacturing jobs assures higher average density.

acres per year, unless office use appropriates more than 100 acres per year of zoned industrial land. If 500 acres per year buildout were achieved, some 4,000 acres of industrial land would be consumed between now and the end of the decade. We have estimated that 350 industrial acres per year represent a more likely buildout figure to accompany the rate of manufacturing expansion projected under the high-growth trend scenario.

As shown in Figure 12, industrial land absorption rates of 250 and 350 acres per year result in requirements of the rest of the decade of 2,000 acres and 2,800 acres, respectively. With the use distributions assumed in Figures 9 and 10 and at manufacturing employment densities consistent with those described in Section E (above), we derive manufacturing employment capacities ranging from 10,000 to 27,500 jobs. These levels correspond closely to the existing trend and high-growth trend scenarios for Sacramento manufacturing jobs growth expected by 1990 (Table 16).

VI
INDUSTRIAL LAND SUPPLY

The key to translating the anticipated demand for industrial sites in the Sacramento region into the reality of job-providing businesses such as high-technology manufacturers is the supply of industrial land, considering both quantity and quality. Like the time frame used in the employment projections and industrial land demand chapters, we will be concerned with the supply requirements until 1990. The lead times required for designating zoning and programming urban services for new industrial districts do not necessitate trying to forecast supply requirements beyond 1990. As long as there is an adequate margin to assure that scarcity will not be a factor in the industrial land market during the last years of the 1980's, maintaining a good industrial development monitoring program is the main safety margin required. Potential industrial development areas for the 1990's will be mentioned.

A. INDUSTRIAL LAND RESOURCES IN PLACER AND YOLO COUNTIES

Both Placer and Yolo Counties have significant manufacturing employment. Manufacturing jobs in 1980 totaled 2,500 in Placer County and 4,800 in Yolo County. Yolo County has several major food processing factories as well as durable goods employment in mobilehome and farm equipment manufacturing. The Port of Sacramento in East Yolo County is surrounded by an industrial district that has primarily developed for warehousing-distribution activities, but includes some heavy manufacturing. Placer County lacks substantial nondurable goods employment, but on the durables side has numerous wood products and building materials manufacturers. South Placer County's distance from the Interstate 5 - Interstate 80 freeway transportation hub has probably contributed to its relatively small wholesale trade employment and warehouse development. However, Placer County has been highly successful in attracting electronics manufacturing firms. While the three major firms employed about 1,100 workers at the end of 1981, by 1985 they may provide 7,500 jobs.

In terms of industrial land for future development, Placer County has a distinct edge over Yolo County. The Sunset Industrial District includes almost 4,300 vacant acres in unincorporated Placer County extending along Highway 65 from Roseville to Lincoln as well as 1,350 vacant acres in the City of Roseville. The Roseville portion includes the Hewlett-Packard and NEC Electronic Arrays sites. Roseville is also the location of Placer Center on I-80 at Douglas Road which includes Shugart Associates as well as 42 additional acres for light industrial use. Scattered smaller industrial districts are located in Roseville and in its neighbor, Rocklin. In addition, the Lincoln Airpark, in early planning stages, is to include almost 900 acres of industrial and office uses. Compared with local government service provision capabilities, the amount of zoned industrial land in the South Placer area is staggering.

In Yolo County, the near-term industrial land supply is more limited, particularly when considering land suitable for high-tech manufacturing. The Port Sacramento Industrial Park (PSIP) includes 600 acres for heavy and light industrial, warehouse, and office uses. About 100 vacant acres are suitable for high-tech uses. Between the largely-developed West Sacramento Port Center and PSIP is the 35-acre Sammis Business Center for which office, high tech, light industrial, and office tenants will be sought to occupy 450,000 square feet of space as yet unbuilt. The City of Davis, about 15 miles west of downtown Sacramento, includes zoned light industrial sites suitable for high-tech use that will accommodate just over one million square feet of building space. The immense tract of land in the Southport area extending all the way to the Solano County line between the Sacramento River and the Deep Water Ship Channel and containing 24,000 acres may eventually be partially zoned to

allow a mix of industrial and residential uses. Yolo County's intention is to ration the amount of land it opens there to industrial development so that it does not outpace residential and public services expansion. This area will not see substantial industrial development until after 1990.

B. INDUSTRIAL LAND RESOURCES IN SACRAMENTO COUNTY

Detailed and up-to-date information is available about the industrial land supply in Sacramento as a result of an industrial land use survey initially undertaken in 1975 by the County Planning Department in cooperation with the Sacramento Area Commerce and Trade Organization. Annual updating of this inventory and monitoring of construction by the Planning Department has resulted in the data used in this analysis.

1. Industrial Land Use Planning Categories.

When looking at the acreage figures for Sacramento's industrial land, it is important to realize that they include land that encompasses a broad range of urban services capabilities, existing industrial uses, and potential for further development. The Sacramento County General Plan, which incorporates land use plans for the Cities of Sacramento, Folsom, Galt, and Isleton, designates an Urban Policy Area that includes only those lands that may be efficiently provided with urban services by linking to existing facilities. The County General Plan includes two principal land use categories for industrial activities. Ordinary manufacturing, processing, warehousing, and research/development activities requiring the full complement of urban services (water, sewer, public streets, fire protection, etc.) are to be located on land designated Industrial Intensive. Land in a second category, Industrial Extensive, serves as a reserve for industrial development after the year 2000, but may be currently used by industries requiring large amounts of land if they provide their own water and sewer systems. The General Plan industrial land use designations used by the Sacramento cities are similar, including light and heavy industrial and industrial reserve categories.

In implementing the General Plan, the Sacramento County Zoning Code provides three general purpose industrial zones in addition to Surface Mining (SM) and Food Processing (FP) combining zones. These are the M-2 Heavy Industrial zone, the M-1 Light Industrial zone, and the MP Industrial-Office Park zone. The spectrum of permitted industrial activities is least restricted in the M-2 zone and most restricted in the MP zone, which has higher development standards for landscaping and other amenities. Over 150 industrial-oriented activities listed in the County Zoning Code include a wide variety of specific manufacturing and fabrication, processing and assembly, industrial yard, storage and warehouse, and other uses. Some of these are only permitted in one or two of the industrial zones and then often only with the issuance of a special use permit. Commercial and office uses, which are more than incidental, require a use permit. The MP Industrial-Office Park zone allows some kinds of commercial activities, including unlimited office use without a use permit. The County's IR Industrial Reserve zone limits the use of designated land to agricultural activities, but earmarks the land as appropriate for eventual industrial use. The Cities of Sacramento and Folsom have light and heavy industrial zones as well as a (PD) Planned Development category that can be used for development of industrial-office parks.

To establish a figure for Sacramento's total industrial acreage requires choosing either General Plan or zoning industrial designations as a basis for the calculation. There are two situations for which General Plan land use category and zoning designation do not correspond closely. One is the military bases which are zoned industrial (except for the family residential area at Mather Field) but shown on the General Plan for Public

and Quasi-Public use rather than an industrial use category. The other is in the Vineyard, Rancho Cordova, and unincorporated Folsom communities in locations largely outside of areas planned for urban services. Much of the land designated Industrial Extensive is zoned agricultural. A substantial share of the Industrial Intensive land in Vineyard's designated Surface Mining area is zoned for agriculture with or without the Surface Mining combining zone. Consequently, the County General Plan indicates nearly 43,000 acres for industrial use. In contrast, zoned industrial land totals over 47,000 acres, but includes the 8,400 acres comprising McClellan and Mather Air Force Bases and the Army Depot.

The two largest contiguous tracts of industrial land in single private ownerships are the Aerojet-General and McDonnell-Douglas properties. About 20% of Aerojet-General's huge tract of land which contains their manufacturing facilities is designated Industrial Intensive. The rest is Industrial Extensive and is considered outside the area planned for sewer and other urban services. The entire 8,360-acre property, including test sites and security/buffer land, is zoned M-2. The McDonnell-Douglas tract consists of 3,860 acres of which only 450 acres are zoned M-2. The rest is zoned AG-80 as a result of its former agricultural preserve status. Only about 200 acres at the Security Park site are indicated on the General Plan as Industrial Intensive while the other 3,660 acres are designated Industrial Extensive.

2. Industrial Land for Intensive Use.

Excluding the military bases, the amount of land designated Industrial Intensive on the General Plan plus the McDonnell-Douglas tract and the rural balance of the Aerojet-General holdings totals about 30,000 acres and is shown on Figure 13. Approximately 21,000 acres of this land is vacant. About 10,000 acres can be classified as vacant, zoned for intensive industrial use, and available for development. Rezoning the former McDonnell-Douglas Williamson Act land could add up to 3,400 additional acres to that 10,000-acre figure.

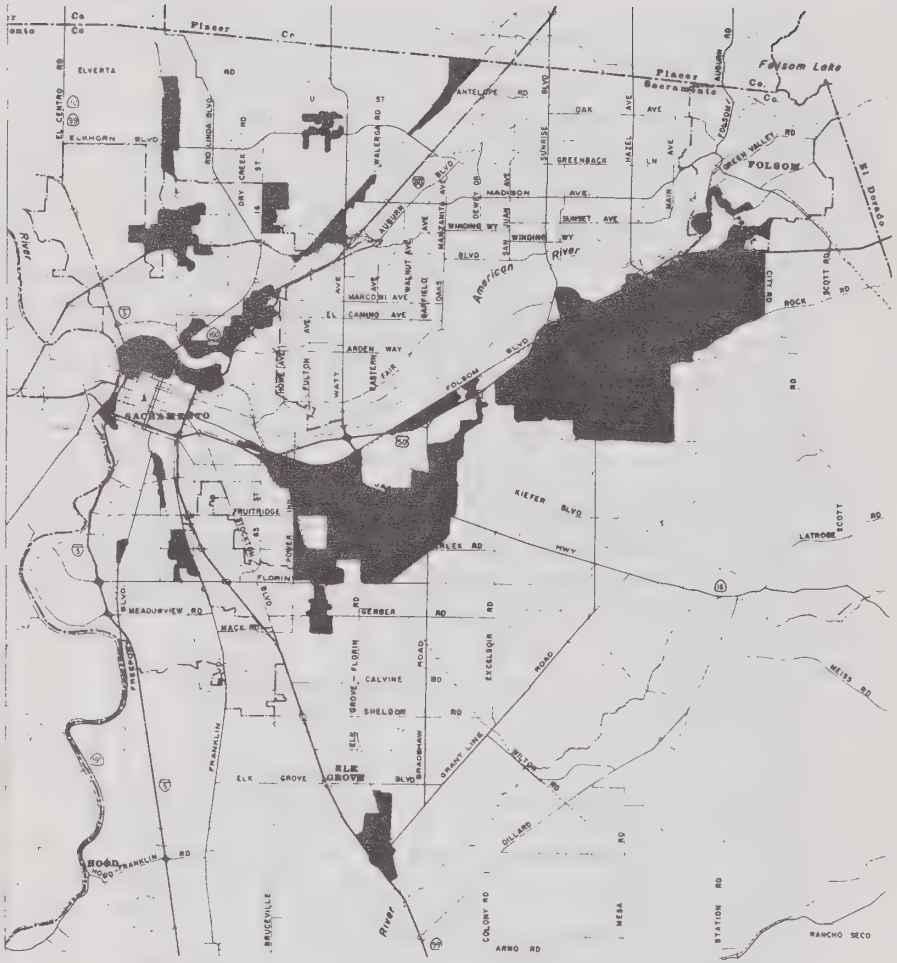


FIGURE 13

SACRAMENTO INDUSTRIAL INTENSIVE LAND PLUS AEROJET AND McDONNELL-DOUGLAS PROPERTIES: 30,000 ACRES.

To sort through this 30,000 acres, we have selected those zoned industrial areas which are rated by the Sacramento Overall Economic Development Program Committee as having prime or good development potential and which include vacant land available for purchase. The Aerojet-General land is excluded, since Aerojet says it will not sell portions of its land. Figure 14 indicates these industrial areas encompassing 12,100 acres of which 6,800 acres are vacant. The map also indicates three constrained sites that could be included in this category. One is the 540-acre, agriculturally-zoned West-of-McClellan area designated industrial on the City of Sacramento General Plan. The second is the Air Force's surplus Splinter City site on Roseville Road proposed for sale under the McClellan Redevelopment Plan, the implementation of which is in serious doubt at this time. The third is the 450 acres of industrially-zoned McDonnell-Douglas land currently unserved by public sewer systems. Including these sites would bring the total vacant prime and good industrial land base to almost 7,800 acres.

3. Vacant Zoned Industrial Land Suitable for High-Tech Use.

Rating the suitability of this available industrial land for use by new high technology firms, which we expect to provide the majority of new Sacramento manufacturing jobs during the 1980's, requires looking at several characteristics of the land. Among the most significant are those factors which high-tech companies have indicated are important in the selection of potential expansion sites. The Brown and Caldwell High-Technology Industrial Site Study included a survey of Bay Area high-tech firms which establishes land prices, public safety services, proximity to an airport, quality of nearby development, freeway access, and contiguous land uses as the most important qualities of a potential new site. Our rating examined a broader range of factors. These include recent market demand for land in each industrial area as reflected in building construction, land absorption, and land prices and lease rate trends; location

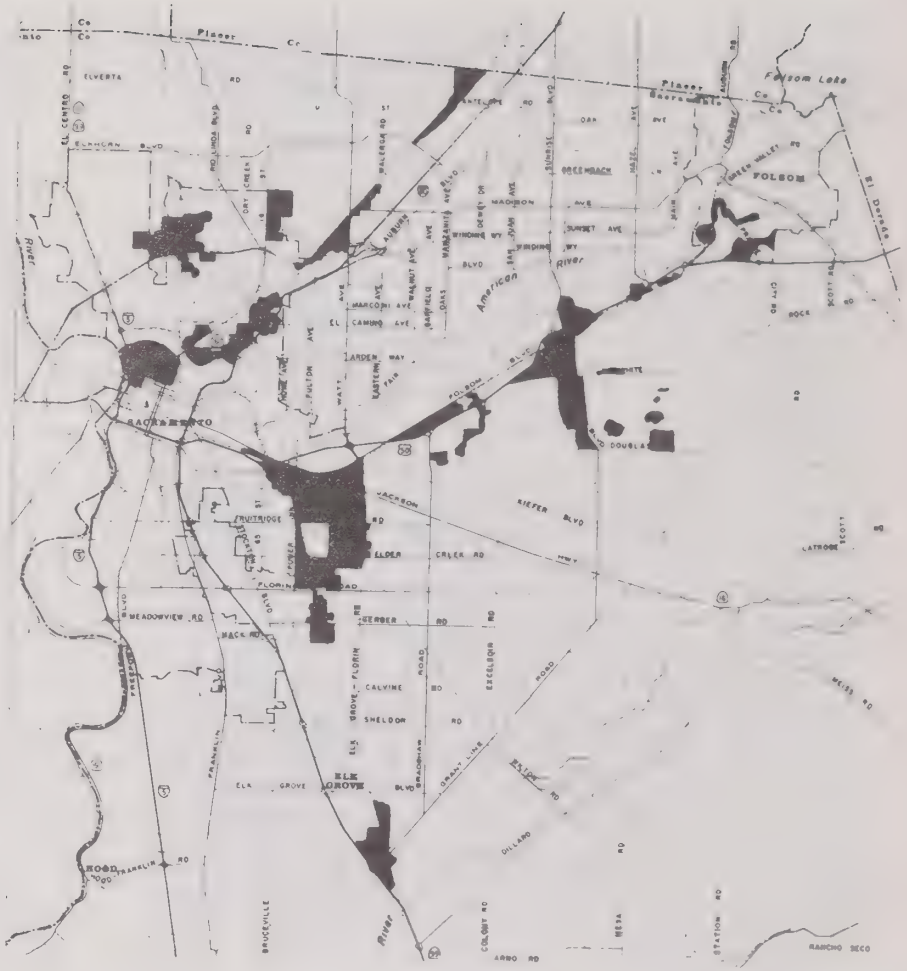


FIGURE 14

ZONED, URBAN INDUSTRIAL AREAS WITH AVAILABLE LAND HAVING PRIME OR GOOD DEVELOPMENT POTENTIAL: 7,800 ACRES.

characteristics such as freeway accessibility, services infrastructure, and proximity to potential worker housing in existing and developing residential neighborhoods; and "image" as reflected in real estate industry interest, compatibility of existing industrial development, and potential land use conflicts. The characteristics of each industrial area relevant to these various factors are summarized in the matrix in Appendix 8.

As a result of this final screening of available vacant industrial land in Sacramento, it appears that land totalling 3,080 acres can be considered suitable for the location of new high-tech manufacturing activities. This suitable land can be further subdivided into two categories based on the characteristics examined. These are 1,950 acres with good to excellent suitability for high-tech development and 1,130 acres with moderate suitability for high-tech use. Within each of the previously-shown industrial area boundaries, those subareas considered suitable for high-tech development are shown in Figure 15.

Highway 50 Corridor

Florin-Perkins - While more oriented to Highway 50 than Highway 99, the 585 acres of suitable land are all located south of Fruitridge Road and are nearly equidistant from the two freeways. Tracts with moderate suitability for high-tech tenants (especially for firms with a "low profile") include the CMD-Fruitridge Industrial Park, the Florin-Perkins IP, tracts owned by Oates, Beneficial Standard, and Northgate Partnership, and several other smaller tracts.

Bradshaw - A total of 320 acres is rated good to excellent for high-tech use and includes the Mayhew Tech Center and Bradshaw Tech Center sites, land along Old Placerville Road from Routier Road to Mather Field Road, and a portion of the Folsom IP on Horn Road and Fife Circle.

FIGURE 15

INDUSTRIAL LAND SUITABLE FOR HIGH TECH MANUFACTURING: 3,080 ACRES

Sunrise - A total of 680 acres including the 250-acre Prospect Business Park, portions of the Gold Circle, Sunrise Gold, Sunrise, and Sunco Industrial Parks, and several large parcels adjacent to the Gold River IP are rated good to excellent.

Hazel-Folsom - A total of 410 acres with good high-tech suitability includes the Lake Forest Tech Center and IP, part of the Prarie City Center, and other industrial projects to be incorporated in the Natoma Station and Folsom Executive Estates residential developments.

Interstate 80 (880) Corridor

Northgate-Norwood - Sites with good to excellent suitability include the 360-acre second phase of the Northgate-880 IP, remaining parcels in Phase One Northgate-880 IP, the Westgate IP (excluding consolidated Freightways), the Norwood Tech Center, and portions of the Norwood IP.

West of McClellan - Although about 500 acres could be considered to have moderate suitability for high-tech use, it was excluded due to current lack of service, interim agricultural zoning, and McClellan's proposal to acquire 240 acres here for Base expansion.

Roseville Road - The 87-acre Splinter City site has moderate suitability, but should be considered constrained because the Air Force's plans to sell it for industrial use have faltered with the Redevelopment Project.

Antelope - A 150-acre tract owned by Southern Pacific which was formerly slated for switching yard expansion is now for sale and has good suitability for high-tech use. It is moderately constrained because it is zoned IR Industrial Reserve and would need a rezone to MP and an industrial-office park design fashioned to protect the adjacent residential area.

Highway 160/80 Corridor

Richards Boulevard - In this older industrial area next to the Central Business District, only 41 acres remain vacant in parcels ranging from 2 to 13 acres. Although the area has freeway access to both I-5 and Highway 160/80, the suitability of these sites for high-tech use is only moderate due to the area's heavy industrial image.

Woodlake-Arden - About 68 acres of vacant land in the Johnston Industrial Park, including the 24-acre River Park addition under construction, represents the only vacant land in this industrial area suitable for high-tech use and has good potential.

El Camino-Marconi - A vacant 51-acre tract owned by Northgate Partnership has moderate suitability for high-tech use. This land is located next to the proposed light rail transit system right-of-way, but street improvements are needed for better I-80 freeway access via Marconi or El Camino Avenues.

Highway 99 Corridor

South Florin - Some 80 vacant acres within this inductrial area have moderate suitability for high-tech use. Distance from Highway 99 and heavy manufacturing image prevent these sites from being rated higher.

Elk Grove -Two tracts in the Elk Grove industrial area are only moderately suitable because of the area's heavy manufacturing character and distance from central Sacramento. Southern Pacific has a 144-acre site and ZVS owns a 32-acre industrial subdivision on Grant Line Road.

4. Industrial Parks Being Marketed for High-Tech Use.

Industrial park and industrial-office projects which are located in the Sacramento jurisdictions and are now being marketed with an eye toward high technology tenants include some in which construction is underway and others still in the planning stages. None of these require major additional government land use planning approvals. The land they utilize is all drawn from the 1,950 acres of industrial land most suitable for high technology users.

The total vacant or unoccupied acreage of these projects is 1,130 acres. They include the Lake Forest Technology Center, Prairie City Center, Prospect Business Park, Bradshaw Technology Center, Mayhew Technology Center, the second phase of Northgate-880 IP, Westgate IP, Norwood Technology Business Park, and portions of Norwood IP. Information about each project is listed in Table 17.

Marketing efforts for these projects aim at attracting a mix of high technology, office, light industrial, and warehouse-distribution tenants. The Prospect Business Park (McKuen & Steele) has restrictive covenants that exclude all users except high technology firms involved in manufacturing. Such siting policies are very helpful for building a marketing image for an industrial park as well as for assuring that prime industrial sites will be reserved for high tech use by restraining competing uses.

Assuming conservatively that high-tech manufacturing firms ultimately occupy only one-third of the space in these ten Sacramento industrial parks, these projects alone represent a capacity for 377 acres of high-tech enterprises. As 40 jobs per acre, a one-third share occupancy of these projects by high-tech firms will yield 15,080 high-technology manufacturing jobs. This amounts to over four times as many high-tech jobs as are forecast for the Sacramento jurisdictions under the existing trend projection and 83% of the 21,200 high-tech jobs forecast with the high-growth trend projection.

TABLE 17
SACRAMENTO HIGH-TECH INDUSTRIAL PARK PROJECTS

JURISDICTION/PROJECT	DEVELOPER	AVAIL./ACRES	PROGRESS	HIGH-TECH TENANTS
Sacramento County				
Prospect Business Park	McKuen & Steele, RJB-Interland	215 ac.	275,000 SF of building space constructed; 90,000 SF available	Cable Data 2nd Foundation Franklin Electric
Mayhew Tech Center	Cook	54 ac.	140,000 SF of building space constructed and available	
Bradshaw Tech Center	RJB-Interland	100 ac.	Preliminary plan for 1.25 million SF of high tech, light industrial, and office space	
Northgate-880 IP	RJB-Interland	390 ac.	About 200,000 SF of space available; no work has begun on the 360-acre 2nd phase	Signetics Computer Hardware
Westgate IP	RJB-Interland	75 ac.	230,000 SF of building space constructed and available	
City of Sacramento				
Norwood Tech BP	Butler-Bancharo-Hathaway	57 ac.	775,000 SF of building space proposed; improvements begun	
Norwood IP	Oates & Massie, RJB	52 ac.	Over 100,000 SF of building space available	Progressive Circuit Products SDI-Synergex
City of Folsom				
Lake Forest IP	ESS-Kinestar	38 ac.	Site improvements completed	
Lake Forest Tech Center	Swank	100 ac.	Site improvements pending	
Prairie City Center	Swank	52 ac.	Development plan being prepared	

5. Suitability of Industrial Land for Large Scale Electronics Firms.

The question has been raised whether the Sacramento jurisdictions have large enough vacant parcels suitable for high-tech use to meet the siting requirements of large-scale high-technology manufacturers. Hewlett-Packard bought a 500-acre site which could ultimately employ as many as 20,000 workers. NEC's Electronic Arrays division bought a 75-acre site. Shugart purchased 30 acres. All three are located in Roseville.

Sufficient land is available now to meet the needs of several firms which propose operations on the scale of Shugart and NEC. In the aggregate, the employment from these firms could easily constitute a substantial addition to the County's manufacturing base and meet or exceed the employment projected for the region by 1990.

For the larger firms, the second phase of RJB-Interland's Northgate-880 Industrial Park contains 357 acres of M-1 land not yet subdivided or improved, and the developer controls the surrounding 560 acres of agriculturally-zoned land lying east of the East Drainage Canal and south of Del Paso Road. Southern Pacific's property at Antelope represents additional acreage suitable for a large electronics firm.

There are few electronics firms like Hewlett-Packard which will reqire a minimum of 500 acres, or even 200 acres, exclusively for their own needs. The prospect of their choosing Sacramento for a new site must be regarded as slight.

6. Proposals for Opening New Areas for Industrial Development.

Even though an expansion of the existing Northgate-880/ Westgate IP complex west to the East Drainage Canal and to freeway access via the constructed but unconnected Truxel Road overpass would create an industrial district with over 1,000 acres of vacant land, RJB Company is proposing that additional land along Interstate 5 be opened for development. The following development proposals or land investments by developers should be considered from the perspective of reasonable industrial land supply requirements. They are shown on Figure 16.

North Natomas

Del Paso and El Centro - Bounded by Del Paso Road, El Centro Road, and the West Drainage Canal, this 450-acre site owned by Cal-Four (G. Tsakopoulos) lies west of I-5 in the City of Sacramento about midway between I-880 and the Metro Airport.

FIGURE 16
PROPOSALS FOR NEW INDUSTRIAL AREAS: 6100 ACRES

San Juan and I-5 - Lying north of San Juan Road and along the west side of I-5, some 225-acres in the City of Sacramento is owned by Sacramento Savings and Loan.

Natomas Airport Area - Bounded by I-5, Del Paso Road, the East Drainage Canal, and the sewage treatment plant, this 1,060-acre tract, including the Bransetter Airport, is owned by Pacific Central Properties (RJF Co.-Sacramento Savings and Loan: at least 585 acres) and the Sacramento Sports Association (430 acres) and located in the City of Sacramento.

Northgate-Westgate Expansion Area - Bounded by Del Paso Road, the East Drainage Canal, I-880, and the Northgate and Westgate Industrial Parks, this 585-acre area is primarily in the jurisdiction of the City of Sacramento (410 acres). The RJB Company has applied for a General Plan Amendment and Williamson Act contract cancellation to allow 153 of the 173 acres lying in unincorporated Sacramento County to be added to Westgate Industrial Park.

South Area

Delta Shores Village - Lying east of I-5 near Freeport in the City of Sacramento, Moss Land Company/Freeport Development have proposed that 352 acres of their 700-acre Delta Shores Village residential project be approved as a high-technology manufacturing park.

Rancho Cordova

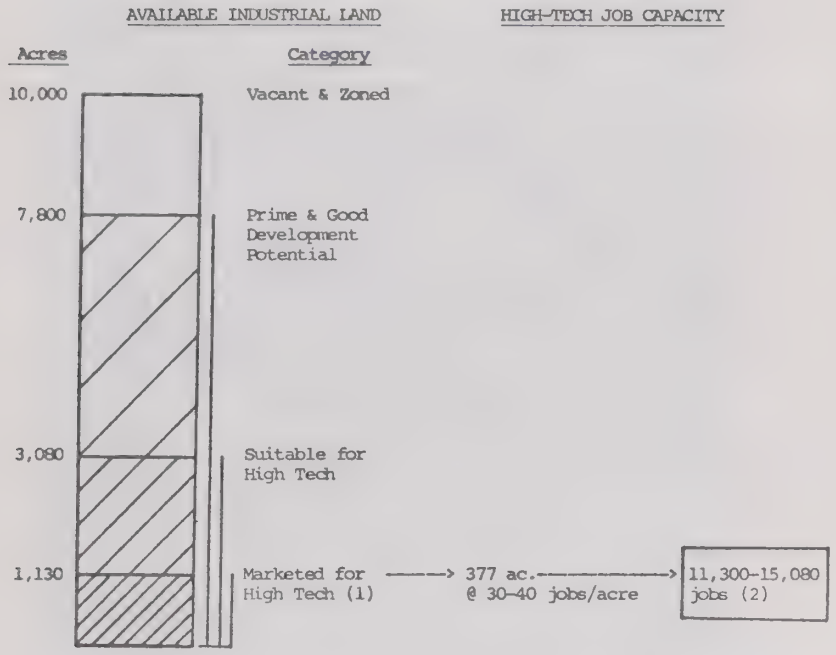
McDonnell-Douglas - In April of 1981, the County approved the cancellation of a Williamson Act agricultural preserve contract that restricted the use of about 3,400 acres of the 3,860 acres owned by McDonnell-Douglas. McDonnell-Douglas indicated during the hearing that it wished to replace the CLCA contract with a "development agreement" with the County presumably spelling out proposed land use, services policies, and the phasing of the project. As yet, nothing has been presented by the developer and the 3,400 acres retains AG-80 agricultural zoning.

If the same approach for estimating high-tech job capacity as applied to the industrial projects being marketed for high-tech use is applied to these proposals for new industrial areas, even the most optimistic projections for Sacramento high-tech employment growth by 1990 are dwarfed. Assuming a one-third occupancy of these new proposed areas by high-tech firms and an average employment of 40 workers per acre, the high-tech job capacity would total 81,340. This assumes that only 785 of the 2,350 acres in the North Natomas area, 118 of the 352 acres at Delta Shores, and 1,135 of the 3,400 acres at McDonnell-Douglas are utilized by high-technology manufacturers.

7. Comparison of Industrial Land Supply and Demand. The industrial-office park projects now being developed and marketed for high-technology tenants in unincorporated Sacramento County (835 acres), the City of Sacramento (105 acres), and the City of Folsom (190 acres) could accommodate most or all of the high-technology firms that can reasonably be expected to locate here by 1990. This will hold true even assuming an optimistically-high capture rate of this expansion throughout the state and nation by the Sacramento jurisdictions such that 18,200 high-technology jobs develop here by 1990 (see Figure 17).

It is unnecessary at this time to consider adding additional land to the vacant industrial land supply. Establishing a regular program to monitor industrial land development and employment growth will provide a means for justifying carefully-considered additions to the industrial land supply as existing supplies are reduced by development for various uses. In conjunction with the monitoring growth in the housing supply, such rezoning applications can be weighed within the framework of maintaining jobs and housing in balance and promoting job-housing linkage.

FIGURE 17
SUPPLY OF INDUSTRIAL LAND IN SACRAMENTO



(1) Projects include Lake Forest Tech, Prairie City, Prospect, Bradshaw Tech, Mayhew Tech, Norwood Tech, Norwood, Westgate, and Northgate-880 Phase Two industrial and business parks.

(2) If one-third high-tech occupancy develops on all 1,950 acres with good to excellent suitability for high-tech use, the job capacity will be 19,500 to 26,000 jobs on 650 acres.

APPENDIX 1
ECONOMIC MULTIPLIERS

During the preparation of this report, we reviewed several methods for developing an unemployment multiplier for the Sacramento region. They are briefly summarized here.

1. Economic Base Multiplier. The simplest method is to define whole sectors of the economy as either basic or nonbasic and calculate the ratio of total jobs to basic jobs. Utilizing the "conventionally-basic" classification of 1970-80 employment in Table 1 yields the following multipliers:

1970	2.82
1980	3.30
1970-80	4.74

These numbers indicate that over time, the economic base multiplier at any given point of time is increasing, as would be expected in a growing economy characterized by strong service sector activity. The 4.74 value is a marginal ratio of the change in basic vs. total jobs. Table 3 projects 29,400 new basic jobs and 165,000 new jobs altogether between now and 1990, based on existing trends. If the marginal ratio of 4.74 is applied to the 29,400 basic jobs, we might instead project 139,000 total new jobs.

This approach is, of course, too simple to stand up under rigorous applications. First, numerous activities in the conventionally-nonbasic sector are actually basic, and vice versa. It is extremely difficult, if not impossible, to accurately isolate them. If we assume 10,000 of the new jobs in the nonbasic sectors were, in fact, basic, and 2,000 of 28,700 new basic jobs were, in fact, service oriented, the marginal ratio drops from 4.7 to 3.7.

Secondly, the use of a multiplier derived by this simple approach implies that growth in the nonbasic sector is entirely dependent on growth in the basic sector. As explained in the text, this is not true. Overall economic growth is influenced by such factors as import substitution; increases in real personal income, household formations, and consumer debt; and the simple inertia of economic growth caused by internal trade and demand in the region.

2. Location Quotients Multiplier. This is a comparative methodology, whereby the region's economy is compared with a larger reference economy, usually at the state or national level. The multiplier is determined by calculating the ratio of each local sector's output to the total local output and comparing it to the ratio of each statewide sector output to total statewide output. A ratio of greater than 1 indicates a net export of goods/services, and a ratio of less than one suggests a net importing of goods and services. This approach was used in a 1978 study of Sacramento's economy by the Business Services Bureau at CSUS, and yielded an estimated multiplier of 2.17.

This approach assumes equal productivity and equal per capita consumption in both areas being compared, which may not be the case. It also requires assuming that the region consumes only local production of the products it exports which, in reality, does not occur. Finally, this method tends to be artificial. For example, if we postulate a city identical in its economy to Sacramento in every way except that the contribution in manufacturing output to the local economy was 10% greater, and the contribution of federal and state output was 10% less, then the resulting multiplier would be 2.77 instead of 2.17. Yet, the total basic output would be the same for both communities.

3. The Gruen & Gruen Multiplier. Gruen, Gruen & Associates compared the ratio between manufacturing jobs and total jobs in Santa Clara County between 1949 and 1978 and applied it to the South Placer area using regression analysis. They arrived at a coefficient of 2.95. This approach, in focusing just on manufacturing jobs, not all basic jobs, has more direct applicability to the queston of high technology job impact.

The Office of Economic Policy Planning and Research in the California State Department of Economic and Business Development has critiqued the Gruen & Gruen Report, concluding that it is "oversimplistic and lacks accuracy in specifying industry sector impacts." The Gruen regression equation, according to the critique, omits relevant variables such as population growth, demand for services, and changes in technology. The fact that many of the manufacturing jobs in Santa Clara are filled by persons living outside the County means that the service jobs and the multiplier effect are spread over several counties. This makes the Gruen multiplier less applicable to the Sacramento region.

Department of Water Resources' Input-Output Model. The critique of the Gruen report by OEPPR also augments the Gruen analysis with projections of secondary employment growth effects based on the California Department of Water Resources Input/Output Model of California. This model identified a multiplier of 2.889 for electrical components which was judged to most closely parallel the type of high-tech growth expected for the Placer area. (Other identified multipliers were computers and office equipment 3.502; communication equipment, 3.246; and miscellaneous electrical products, 3.923). This means that for every new electrical component job in Placer County, 1.889 additional jobs would be induced or indirectly created throughout the statewide economy. To assess what the impact would be on the Sacramento Region, OEPPR staff "for the sake of argument, . . . assumed that the entire Sacramento Basin* will receive 56%, 64%, 72%, and 80% of indirect and induced job gains," respectively, in each 5-year increment between 1980-2000. "This more-closely approximates the Department of Water Resources' multiregional input-output estimates of leakages in final demand for the San Francisco-San Jose watershed." OEPPR increased the percentage over time in the belief that as the Sacramento regional economy becomes more developed and less dependent on purchases from other regions, the portion of final demand located in the Sacramento Basin from a change in basic, indirect, and induced employment will rise. The corresponding regional economic multipliers derived from the above assumptions are 2.05, 2.21, 2.36, and 2.51.

McDonald & Associates Multiplier. The following excerpts from McDonald & Associates report, Sacramento Area Employment & Land Use Projections, describe their methodology in deriving a 1.71 multiplier for high-technology jobs in the region:

> An input/output model for Sacramento County was developed by McDonald & Associates specifically for the present project (R-58). This model produces employment, income, and dollar flow multipliers by sector for Sacramento County. The employment multiplier from the high-technology sector was used to project the multiplier impact of employment growth in the Sacramento region.
>
> It should be noted that the input/output model was prepared for Sacramento County while the base employment projections are for the Sacramento SMSA, which includes Sacramento County, Placer County, and Yolo County. Sacramento County represents 80% of the SMSA, and the multipliers generated for the county are a fair representation of the potential multipliers for the Sacramento SMSA. These multipliers represent a conservative estimate. The multipliers for the entire SMSA would undoubtedly be slightly higher than the county multipliers since Sacramento County "imports" goods and services from other counties in the SMSA.

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* Encompassing the entire Sacramento Valley and Northern Sierra. This hydrologic basin includes all of the Sacramento SMSA except Lake Tahoe. Almost all of the economic impact in the basin would be felt in the SMSA.

The input/output model is based on the fundamental assumption that regional industries trade with one another. For example, a retail trade store will use a local transportation service to deliver goods and a local accounting firm to do their bookkeeping. The regional input/output model not only traces the flow of goods and services among local industries, but also provides estimates of trade flow into and out of local areas for the various sectors of the model. Based on the total dollar flow in each industry category and the purchasing and expenditure characteristics of the industries, the model generates the interindustry transactions for both purchases and expenditures.

The Sacramento I/O Model is based on data from various sources:

- The expenditure and sales characteristics of each industry are developed from a set of national coefficients which have been modified to represent local inter-industry structure. The national coefficients are derived from national direct survey results conducted in 1973 and updated to 1977. These results are then modified to meet local industry structure running the model on 427 disaggregated sectors. The model is then balanced at the 427-sector level. The RAS or biproportional matrix adjustment technique was the primary method used to incorporate regional economic data and to "balance" the final Dollar Flow Table (i.e. to reconcile inevitable inconsistencies among data. For the sake of simplicity and clarity, the model was aggregated into thirteen relevant sectors for the analysis of the Sacramento County.

- County estimates of gross domestic output and sector employment have been derived from:

  Agricultural Statistics issued by the Department of Agriculture. This annual publication represents the primary source for the agricultural gross output for counties in the state. This information is also augmented with data from the Agricultural Commissioner's report issued by individual counties throughout California.

  County Business Patterns issued by the Bureau of the Census . The County Business Patterns produces employment payroll data for counties, states, and the nation. The data on production worker payrolls can be used to estimate levels of industrial output for counties. This data is particularly useful in that it is broken down into four digit SIC (Standard Industrial Classifications). The major shortcoming of this information is the nondisclosure regulations requiring the Bureau of Census to withhold certain payroll and employment data if there are less than three employers in the region. To fill in these areas where there are deficiencies of data it is necessary to rely on Dunn and Bradstreet information.

The county models for the fifty-eight counties in California are then balanced to equal a statewide model. The development of county input/output models is a relatively inexpensive method of developing comprehensive information for each sector of a regional economy. However, the input/output model represents a "snapshot" of the county's economy and assumes that the purchasing patterns will change slowly over time. The data used in this model is based on information and inter-industry transactions developed in 1977.

APPENDIX 2
EMPLOYMENT TERMINOLOGY

Civilian Labor Force: The sum of total civilian employment and unemployment.

Total Civilian Employment: The sum of wage and salary employment, private household, self-employed, and unpaid family workers, and those on trade disputes; adjusted to eliminate double counting of persons holding more than one job and to a place of residence basis.

Employed persons comprise (a) all civilians who, during the survey week, did any work at all as paid employees, or in their own business or profession or on their own farm, or who worked 15 hours or more as unpaid workers in a family enterprise; and (b) all those who were not working but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, labor-management dispute, personal reasons, whether or not they were paid for the time off.

Total Unemployment: The sum of persons receiving unemployment insurance benefits, persons who have exhausted their unemployment insurance benefits and are still unemployed, persons who have delayed filing for benefits but who are not working, unemployed persons who applied for benefits but were not qualified to receive them, workers separated from industries not covered by unemployment insurance, and unemployed persons newly entering or re-entering the labor force.

Unemployed persons comprise all civilians who did not work during the survey week, who made specific efforts to find a job within the past four weeks, and who were available for work (except for temporary illness) during the survey week. Also included as unemployed are those who did not work at all, but were available for work and (a) were waiting to be recalled to a job from which they had been laid off for a specific time; or (b) had a new job to go to within thirty days.

Unemployment Rate: The unemployment rate is derived by dividing the total number of unemployed by the total civilian labor force; the result, expressed as a percentage, is referred to as the "unadjusted unemployment rate."

Agricultural Wage and Salary Employment: Includes all full-time employees on paid vacation or paid sick leave) who work in or receive compensation from agricultural establishments for any part of the pay period including the 12th of the month.

Non-agricultural Wage and Salary Employment: Includes all full-time and part-time employees of all classes (including employees on paid vacation or paid sick leave) who work in or receive compensation from nonagricultural establishments for any part of the pay period including the 12th of the month.

Standard Metropolitan Statistical Area (SMSA): A term applied by the Office of Federal Statistical Policy and Standards, U.S. Department of Commerce to counties or aggregations of counties that have one or more central core cities and that meet specified criteria of population, population density, commute patterns, and social and economic integration.

Labor Market Area (LMA): Synonymous with the term "SMSA" in the areas designated as SMSAs. The remainder of the State's counties are included in Labor Market Areas (LMA). Except for the Marysville-Yuba City Labor Market Area (containing both Yuba and Sutter counties), all non-SMSA Labor Market Areas contain only one county. Similar to SMSAs, Labor Market Areas are named for one or more of the areas' central cities.

APPENDIX 3

CALCULATION OF LABOR FORCE PARTICIPATION RATES FOR SACRAMENTO SMSA

A. Calculation for 1970

1. Civilian labor force = 119,778 female +189,789 male = 309,567

2. Population 16 and over = 267,196 male +284,306 female = 551,502

3. Labor force participation rate $= \frac{309,567}{551,502} = 56.13\%$

SOURCE: Bureau of Census Report PC(1)-D6 Calif. Detailed Characteristics of Calif. Table 164.

B. Calculation for 1980

1. Civilian labor force, 1980 annual average = 466,700

SOURCE: EDD, Annual Planning Information Sacramento SMSA, 1981-82.

2. Population 16 and over:

1980 Census age distribution is as yet unavailable, so the following approximation was used:

	1980 Population (1)	% of Population 16 + (2)	Population 16 and Over
Sacramento	783,380	.7666	600,540
Yolo	113,410	.7729	87,654
Placer	117,250	.7628	89,438
			777,632

(1) Bureau of Census, 2nd Interim Projections.

(2) E-150 population projection series by Population Research Unit of Department of Finance made in 1977. Total population for 15-20 age group was divided by 5 to determine age 15 population.

3. Labor force participation rate $= \frac{466,700}{777,632} = 60\%$

C. Increase in work force 1970-80 attributable to increased labor force participation.

1980 population 16 and over	= 782,633
1970 labor force participation rate	= .5613
	439,292
Actual labor force	466,700
	-439,292
	27,408

APPENDIX 4
OTHER EMPLOYMENT PROJECTIONS FOR SACRAMENTO SMSA

TABLE A-1
EMPLOYMENT GROWTH PROJECTED BY EMPLOYMENT DEVELOPMENT DEPARTMENT

Industry[1]	Number of Employed Individuals[2]			Annual Average Growth Rate	
	Actual 1976	Projected 1980	Projected 1985	76-80	80-85
Total, All Industries[3]	364,400	448,400	534,900	5.8	3.9
Agriculture, Forestry, & Fisheries	13,300	13,500	14,100	0.4	0.9
Mining	400	500	500	6.3	0.0
Construction	22,700	36,000	41,200	14.6	2.9
Manufacturing	25,400	31,500	40,100	6.0	5.5
Nondurable Goods	13,400	15,100	16,300	3.2	1.6
Food & Kindred Products	7,100	7,500	7,500	1.4	0.0
Printing & Publishing	3,800	4,300	4,800	3.3	2.3
Other Nondurable Goods	2,500	3,300	4,000	8.0	4.2
Durable Goods	12,000	16,400	23,800	9.2	9.0
Electrical Machinery	500	1,200	5,000	35.0	63.3
Transportation Equipment	4,300	5,700	7,400	8.1	6.0
Other Durable Goods	7,200	9,500	11,400	8.0	4.0
Transportation, Communications, & Utilities	22,800	29,700	35,100	7.6	3.6
Transportation	10,500	14,000	16,400	8.3	3.4
Communications & Utilities	12,300	15,700	18,700	6.9	3.8
Trade	82,000	105,800	128,600	7.3	4.3
Wholesale Trade	14,100	17,100	19,400	5.3	2.7
Retail Trade	67,900	88,700	109,200	7.7	4.6
General Merchandise	11,900	13,800	16,000	4.0	3.2
Food & Dairy Stores	9,800	12,200	14,000	6.1	3.0
Auto Dealers & Gas Stations	9,400	10,800	13,600	3.7	5.2
Eating & Drinking Places	19,200	26,500	33,300	8.5	5.1
All Other Retail Trade	17,600	25,400	32,300	11.1	5.4
Finance, Insurance, & Real Estate	17,000	23,800	34,700	10.0	9.2
Finance	6,200	9,100	12,300	11.7	7.0
Insurance	5,700	6,900	8,800	5.3	5.5
Real Estate	5,100	7,800	13,600	13.2	14.9
Services	121,000	145,100	175,600	5.0	4.2
Hotels & Lodging Places	4,200	5,700	7,800	8.9	7.4
Business Services	7,600	12,600	17,500	16.4	7.8
Medical & Other Health	26,500	31,000	38,200	4.2	4.6
Education	45,100	46,700	50,000	0.9	1.4
All Other Services	37,600	49,100	62,100	7.6	5.3
Public Administration	59,800	62,500	65,000	1.1	0.8

1/ Major industries are aggregated here according to the census classification method. All classes of civilian workers are included (private wage and salary, self-employed, unpaid family, and government). A major proportion of government workers are assigned to the various industries in which they would appear if they were in private employment; i.e., construction crafts workers employed by government agencies are counted with construction; municipal utility workers are counted with transportation, communications, & utilities; and public school employees are included with education as part of the services industries. Remaining in public administration are such groups as public officials, police officers and fire fighters, and employees of regulatory agencies.

2/ Industry totals have been rounded to the nearest hundred.

3/ Individual line items may not add to totals because of rounding.

APPENDIX 4
OTHER EMPLOYMENT PROJECTIONS FOR SACRAMENTO SMSA

TABLE A-2
EMPLOYMENT GROWTH PROJECTED BY SACRAMENTO CITY PLANNING DEPARTMENT

	NUMBER OF EMPLOYEES (in Thousands)					ANNUAL AVERAGE GROWTH RATE	
	ACTUAL		PROJECTED				
	1972	1980	1981	1982	1985	1972-80	1980-85
All Industries	293.5	408.4	416.5	432.6	488.0[1]	4.9%	3.9%
Agriculture	9.1	9.1	8.8	8.7	9.5	0.0	0.9
Mining	0.2	0.5	0.5	0.6	0.5	18.8	0.0
Construction	14.0	19.3	19.3	22.5	22.1	4.7	2.9
Manufacturing	22.5	27.2	28.3	30.4	34.7	2.6	5.5
Transportation and Public Utilities	17.5	21.7	22.3	23.4	25.6	3.0	3.6
Trade	62.0	93.9	96.5	100.0	114.1	6.4	4.3
Finance, Insurance and Real Estate	12.0	22.3	23.0	24.0	32.6	10.7	9.2
Services	43.6	73.4	76.0	80.0	88.8	8.5	4.2
Government	112.7	141.1	141.8	143.0	146.7	3.1	0.8

(1) Individual sector totals = 474.6

SOURCE: Harnish, Jim & Stephen Jenkins; Accelerated General Plan Revising Growth Concepts Issue Paper; September 25, 1981.

APPENDIX 5

RELATIONSHIPS BETWEEN BASIC AND TOTAL ECONOMIC GROWTH
IN MAJOR ECONOMIC REGIONS OF THE STATE

TABLE A5-1

EMPLOYMENT GROWTH
1970-1980
(in 1000's of jobs)

	LOS ANGELES	SAN FRANCISCO BAY AREA	SAN DIEGO	SACRAMENTO	COASTAL METROPOLITAN COUNTIES	SAN JOAQUIN METROPOLITAN COUNTIES	NON-METROPOLITAN AREAS	TOTAL
1970 Basic Jobs	1,274.9	567.2	120.3	101.8	68.5	170.1	175.4	2,478.2
1980 Basic Jobs	1,614.4	712.1	188.2	129.3	96.3	238.3	217.5	3,196.1
Net Gain	339.5	144.3	67.9	27.5	27.8	68.2	42.1	717.9
% Increase	26.6%	25.5%	56.4%	27%	40.6%	40.1%	24%	28.0%
1970 Total Jobs	4,131.0	1,968.0	444.3	300.0	224.5	483.1	484.7	8,035.6
1980 Total Jobs	5,594.9	2,678.5	729.7	443.7	331.9	694.2	673.6	11,146.5
Net Gain	1,463.9	710.5	285.4	143.7	107.4	211.1	188.9	3,110.9
% Increase	35%	36%	64%	47.9%	48%	44%	39%	38.7%
1970 Ratio	3.24	3.47	3.69	2.95	3.28	2.84	2.76	3.24
1980 Ratio	3.47	3.76	3.88	3.43	3.45	2.91	3.10	3.49
Marginal Ratio	4.31	4.92	4.20	5.23	3.86	3.10	4.49	4.33

SOURCE: Center for the Continuing Study of California's Economy.

TABLE A5-2

PROJECTED EMPLOYMENT GROWTH
1980-1990
(in 1000's of jobs)

	LOS ANGELES	SAN FRANCISCO BAY AREA	SAN DIEGO	SACRAMENTO	COASTAL METROPOLITAN COUNTIES	SAN JOAQUIN METROPOLITAN COUNTIES	NON-METROPOLITAN AREAS	TOTAL
1980 Basic Jobs	1,614.4	712.1	188.2	129.3	96.3	238.3	217.5	3,196.1
1990 Basic Jobs	1,872.4	802.5	222.6	160.1	110.9	259.7	236.4	3,664.6
Net Gain	258.0	90.4	34.4	30.8	14.6	21.4	18.9	468.5
% Increase	16%	12.7%	18.3%	23.8%	15.2%	9%	8.7%	14.7%
1980 Total Jobs	5,594.9	7,678.5	729.7	443.7	331.9	694.2	673.6	11,146.5
1990 Total Jobs	6,739.0	3,175.0	952.0	569.0	422.0	835.0	806.0	13,498.0
Net Gain	1,144.1	496.5	222.3	125.3	90.1	140.8	132.4	2,351.5
% Increase	20.4%	18.5%	30.5%	28.2%	27.1%	20.3%	19.7%	21.1%
1980 Ratio	3.47	3.76	3.88	3.43	3.45	2.91	3.10	3.49
1990 Ratio	3.60	3.96	4.28	3.55	3.80	3.22	3.41	3.68
Marginal Ratio	4.43	5.49	6.46	4.08	6.17	6.58	7.00	5.02

SOURCE: Center for the Continuing Study of California's Economy.

APPENDIX 6
HIGH TECHNOLOGY INDUSTRIES
EXCERPTS FROM STANDARD INDUSTRIAL CLASSIFICATION CODE

Major Group 35.—MACHINERY, EXCEPT ELECTRICAL

The Major Group as a Whole

This major group includes establishments engaged in manufacturing machinery and equipment, other than electrical equipment (Major Group 36) and transportation equipment (Major Group 37). Machines powered by built-in or detachable motors ordinarily are included in this major group, with the exception of electrical household appliances (Major Group 36). Portable tools, both electric and pneumatic powered, are included in this major group, but hand tools are classified in Major Group 34.

OFFICE, COMPUTING, AND ACCOUNTING MACHINES

3573 Electronic Computing Equipment

Establishments primarily engaged in manufacturing electronic computers and peripheral equipment and/or major logical components intended for use in electronic computer systems. Included are general-purpose electronic analog computers, electronic digital computers, military, ruggedized, and special purpose computers. The electronic computers may be used for data processing or may be incorporated as components of control equipment for industrial use, and as components of equipment used in weapons and weapons systems, space and oceanographic exploration, transportation and other systems. Electronic computer systems contain high speed arithmetic and program control units, on-line information storage devices, input/output equipment, terminals, data communication devices, and punched card equipment. Examples of input/output equipment are converters (card and/or tape), readers and printers. Examples of storage devices are magnetic drums and disks, magnetic cores and magnetic film memories. In addition to providing technical manuals necessary for the operation and maintenance of the equipment, establishments in this industry usually furnish general-purpose computer programs and basic operating systems programs needed for effective use of the computer system. Establishments primarily producing rebuilt electronic computers are also included in this industry. Establishments primarily engaged in manufacturing desk calculators, cash registers, accounting machines and similar equipment, that are operator-paced are classified in Industry 3574; electrical and electronic test equipment in Industry 3825; industrial controls, including electronic, in Industry 3622; and industrial process instruments in Industry 3823.

- Accounting machines using machine-readable programs
- Analog computers
- Auxiliary storage units
- Calculating machines, electronic: utilizing machine-readable programs
- Card punching, sorting, and tabulating machines
- Central processing units for electronic computing systems
- Computing machines, electronic
- Converters, digital and analog: except instrumentation type
- Data computing and correcting systems, electronic
- Digital computers
- Disk and drum drives and devices, magnetic
- Electronic computing machines
- Film reader and digital storage photo-theodolite devices
- Gun data computers
- Keypunches: key to tape and key to disk devices
- Magnetic ink readers, sorters, and inscribers
- Office machine control panels
- Paper tape punches and readers
- Printers, including strip (computer peripheral equipment)
- Recorders, tape: for data computers
- Scanners and readers, optical (input device)
- Speed computers
- Storage units, computer
- Tabulating machines
- Tape transport systems for electronic computers

Major Group 36.—ELECTRICAL AND ELECTRONIC MACHINERY, EQUIPMENT, AND SUPPLIES

The Major Group as a Whole

This major group includes establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy. The manufacture of household appliances is included in this group, but industrial machinery and equipment powered by built-in or detachable electric motors is classified in Major Group 35. Establishments primarily engaged in manufacturing instruments for indicating, measuring, and recording electrical quantities are classified in Industry 3825.

RADIO AND TELEVISION RECEIVING EQUIPMENT, EXCEPT COMMUNICATION TYPES

3651 Radio and Television Receiving Sets, Except Communication Types

Establishments primarily engaged in manufacturing electronic equipment for home entertainment, including auto radios and tape players. This industry also includes establishments primarily engaged in manufacturing public address systems and music distribution apparatus. Establishments primarily engaged in manufacturing phonograph records and pre-recorded tape are classified in Industry 3652. Establishments primarily engaged in manufacturing separate cabinets for home electronic equipment are classified in Major Group 25.

- Amplifiers: radio, public address, or musical instrument
- Audio electronic systems, except communication
- Coin-operated phonographs
- FM and AM tuners
- Home recorders, cassette, cartridge and reel
- Juke boxes
- Loudspeakers, electrodynamic and magnetic
- Microphones
- Music distribution apparatus, except records or tape
- Musical instrument amplifiers
- Phonograph and radio combinations
- Phonograph turntables
- Phonographs, including coin-operated
- Pickup heads, phonograph
- Pillows, stereo
- Public address systems
- Radio and phonograph combinations
- Radio receiving sets
- Recording machines, music and speech: except office and industrial
- Sound reproducing equipment: except motion picture
- Speaker monitors
- Speaker systems
- Television receiving sets
- Turntables, for phonographs
- Video triggers (remote control TV devices)

3652 Phonograph Records and Pre-recorded Magnetic Tape

Establishments primarily engaged in manufacturing phonograph records and pre-recorded magnetic tape. Establishments primarily engaged in manufacturing electronic equipment for home entertainment, except records and pre-recorded magnetic tape, are classified in Industry 3651.

- Magnetic tape, pre-recorded
- Master records or tapes, preparation of
- Phonograph record blanks
- Phonograph records (including preparation of the master)
- Pre-recorded magnetic tape
- Record blanks, phonograph
- Recording studios
- Records, phonograph
- Tape, magnetic: pre-recorded

3661 Telephone and Telegraph Apparatus

Establishments primarily engaged in manufacturing wire telephone and telegraph equipment, and parts especially designed for telephone and telegraph use.

- Autotransformers for telephone switchboards
- Carrier equipment, telephone and telegraph
- Communication headgear, telephone
- Data sets, telephone and telegraph
- Electronic secretary
- Headsets, telephone
- Message concentrators
- PBX equipment, dial and manual
- Switchboards, underwater: telephone and telegraph
- Telegraph office switching equipment
- Telephone central office equipment, dial and manual
- Telephone dialing devices, automatic
- Telephone sets, all types
- Telephone station equipment and parts, wire
- Telephones, sound powered (no battery)
- Telephones, underwater
- Teletypewriters
- Telewriters

3662 Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus

Establishments primarily engaged in manufacturing (1) radio and television broadcasting equipment; (2) electric communication equipment and parts, except telephone and telegraph; (3) electronic field detection apparatus, light and heat emission operating apparatus, object detection apparatus and navigational electronic equipment, and aircraft and missile control systems; and (4) high energy particle accelerator systems and equipment designed and sold as a complete package for radiation therapy, irradiation, radiographic inspection, and research (linear accelerators, betatrons, dynamotrons, Vandergraff generators, resonant transformers, insulating core transformers, etc.); (5) high energy particle electronic equipment and accessories sold separately for the construction of linear accelerators, cyclotrons, synchrotrons, and other high energy research installations (transmitters/modulators, accelerating waveguide structures, pulsed electron guns, vacuum systems, cooling systems, etc.); (6) other electric and electronic communication and signaling products, not elsewhere classified. Establishments primarily engaged in manufacturing transmitting tubes are classified in Industry 3673.

- Accelerating waveguide structures
- Air traffic control systems and equipment, electronic
- Aircraft control systems, electronic
- Amplifiers: other than radio, public address, and musical instrument
- Antennas, radar and communications
- Antennas, television transmitting
- Atom smasher (particle accelerators)
- Betatrons
- Broadcasting equipment, radio and television
- Burglar alarm apparatus, electric
- Cleaning equipment, ultrasonic
- Communication equipment and parts, electronic: except telephone, telegraph
- Communication equipment, mobile and micro-wave
- Control receivers
- Countermeasure simulators, electric
- Cyclotrons
- Detection apparatus: electronic and magnetic field, and light and heat
- Digital encoders
- Direction finders, radio
- Door opening control devices, radio and photoelectric cell operated
- Dynamotrons
- Electron beam metal cutting, forming and welding machines
- Electron beam welders
- Electron linear accelerators
- Electronic control, detection, or communication systems
- Electronic field detection apparatus
- Electrostatic particle accelerators
- Facsimile equipment, radio
- Fire alarm apparatus, electric
- Fire control and bombing equipment, electronic
- Flight simulators (training aids), electronic
- Geophysical and meteorological electronic equipment
- Heat emission operating apparatus
- Highway signals, electric
- Hydrophones
- Inertial guidance systems
- Infra-red object detection equipment
- Instrument landing systems (ILS), airborne and ground
- Intercommunication systems, electric
- Laser systems and equipment, except scientific and engineering instruments
- Light and heat emission operating apparatus
- Linear accelerators
- Loran equipment
- Magnetic amplifiers, except home type
- Magnetic field detection apparatus
- Marine horns, electric
- Maser equipment, all types
- Micro-wave communication equipment
- Missile control systems
- Missile fuel management systems
- Mobile communication equipment
- Modems, except telephone and telegraph data sets
- Multiplex equipment
- Navigational electronic equipment (ILS, DME, VOR, TACAN)
- Object detection apparatus (radar)

3662 Radio and Television Transmitting, Signaling, and Detection Equipment and Apparatus—Continued

- Particle accelerators, high voltage
- Photographic control systems, electronic
- Phototransmission equipment, radio
- Pulsed electron guns
- Radar equipment
- Radio and television switching equipment
- Radio antennas (transmitting and receiving) and ground equipment
- Radio compasses
- Radio receiver networks
- Radio telephone and telegraph equipment, except tubes
- Railroad signaling devices, electric
- Receiver-transmitter units (transceiver)
- RF power amplifiers, and IF amplifiers: sold separately
- Satellites
- Sighting and fire control equipment, electronic type
- Signaling apparatus, electric
- Signals: railway, highway, and traffic—electric
- Sirens, electric: vehicle, marine, industrial, and air raid
- Sonar equipment
- Sound signaling devices, electrical
- Target signals, synthetic: to operate radar receivers and repeaters
- Telemetering equipment, electronic
- Television antennas (transmitting) and ground equipment
- Television closed circuit equipment
- Television monitors
- Time decoders
- Traffic signals, electric
- Training devices, electronic
- Transmitting apparatus, radio and television: except tubes
- Transponders
- Ultrasonic cleaning equipment
- Ultrasonic generators sold separately for inclusion in tools and equipment
- Ultrasonic welding machines and equipment
- Underwater sound equipment
- Waveguide pressurization equipment
- Weapon simulators

ELECTRONIC COMPONENTS AND ACCESSORIES

3671 Radio and Television Receiving Type Electron Tubes, Except Cathode Ray

Establishments primarily engaged in manufacturing radio and television receiving type electron tubes, except cathode ray tubes. Establishments primarily engaged in manufacturing television receiving type cathode ray tubes are classified in Industry 3672; transmitting tubes in Industry 3673; and X-ray tubes in Industry 3693.

- Electron tubes, radio and television receiving: except cathode ray tubes

3672 Cathode Ray Television Picture Tubes

Establishments primarily engaged in manufacturing television receiving type cathode ray tubes. Establishments primarily engaged in manufacturing other radio and television receiving type electron tubes are classified in Industry 3671; and transmitting tubes in Industry 3673.

- Cathode ray television receiving type tubes
- Picture tube reprocessing
- Television receiving type tubes, cathode ray

3673 Transmitting, Industrial, and Special Purpose Electron Tubes

Establishments primarily engaged in manufacturing transmitting, industrial, and special purpose electron tubes. Establishments primarily engaged in manufacturing radio and television receiving tubes are classified in Industry 3671; television receiving type cathode ray tubes in Industry 3672; and X-ray tubes in Industry 3693.

- Cathode ray tubes, except television receiving type
- Electron beam (beta ray) generator tubes
- Electron tubes: transmitting, industrial, and special purpose
- Gas and vapor tubes
- Geiger Mueller tubes
- Industrial electron tubes
- Klystron tubes
- Light sensing and emitting tubes
- Magnetrons
- Transmitting electron tubes
- Traveling wave tubes
- Tubes for operating above the X-ray spectrum (with shorter wavelength)
- Vacuum capacitors, relays, and switches

3674 Semiconductors and Related Devices

Establishments primarily engaged in manufacturing semiconductor and related solid state devices, such as semiconductor diodes and stacks, including rectifiers, integrated microcircuits (semiconductor networks), transistors, solar cells, and light sensing and emitting semiconductor (solid state) devices.

- Computer logic modules
- Controlled rectifiers, solid state
- Diodes, solid state (germanium, silicon, etc.)
- Electronic devices, solid state
- Fuel cells, solid state
- Gunn effect device
- Hall effect devices
- Hybrid integrated circuits
- Infra-red sensors, solid state
- Light emitting diodes
- Light sensitive devices, solid state
- Magnetic bubble memory device
- Magnetohydrodynamic (MHD) devices
- Memories, solid state
- Metal oxide silicon (MOS) devices
- Microcircuits, integrated (semiconductor)
- Modules, solid state
- Molecular devices, solid state
- Monolithic integrated circuits (solid state)
- Nuclear detectors, solid state
- Parametric diodes
- Photoelectric cells, solid state (electronic eye)
- Photovoltaic devices, solid state
- Rectifiers, solid state
- Semiconductor circuit networks (solid state integrated circuits)
- Semiconductors (transistors, diodes, etc.)
- Solar cells
- Solid state electronic devices
- Strain gages, solid state
- Stud bases or mounts for semiconductor devices
- Switches, silicon control
- Thermionic devices, solid state
- Thermoelectric devices, solid state
- Thin film circuits
- Transistors
- Tunnel diodes
- Ultra-violet sensors, solid state
- Variable capacitance diodes
- Zener diodes

3675 Electronic Capacitors

Establishments primarily engaged in manufacturing electronic capacitors.

Capacitors, electronic: fixed and variables
Condensers, for electronic end products

3676 Resistors, for Electronic Applications

Establishments primarily engaged in manufacturing resistors for electronic end products. Establishments primarily engaged in manufacturing resistors for telephone and telegraph apparatus are classified in Industry 3661.

Resistors, for electronic end products
Thermistors, except temperature sensors
Varistors

3677 Electronic Coils, Transformers and Other Inductors

Establishments primarily engaged in manufacturing electronic coils, transformers, and inductors. Establishments primarily engaged in manufacturing transformers and inductors for telephone and telegraph apparatus are classified in Industry 3661; electric lamps in Industry 3641; and semiconductor (solid state) and related devices in Industry 3674.

Baluns
Coil windings, electronic
Coils, chokes and other electronic inductors
Filters, electronic
Inductors, electronic
Transformers, electronic types

3678 Connectors, for Electronic Applications

Establishments primarily engaged in manufacturing electronic connectors. Establishments primarily engaged in manufacturing electronic capacitors are classified in Industry 3675; and electronic coils, transformers and other inductors in Industry 3677.

Connectors, for electronic applications

3679 Electronic Components, Not Elsewhere Classified

Establishments primarily engaged in manufacturing electronic components, not elsewhere classified, such as receiving antennas, printed circuits, switches, and waveguides.

Antennas, receiving: automobile, home, portable
Attenuators
Circuit boards, television and radar: electric—printed
Commutators, electronic
Constant impedance transformers
Cores, magnetic
Cryogenic cooling devices (cryostats, etc.) for infra-red detectors, masers
Crystals and crystal assemblies, radio
Delay lines
Electronic circuits, except semiconductor or solid state
Electronic tube parts, except glass blanks
Ferrite electronic parts
Harness assemblies, for electronic use: wire and cable
Headphones, radio
Hermetic seals, for electronic equipment
Impedance conversion units, high frequency
Loads, electronic
Magnetic recording tape
Microwave components
Oscillators, except laboratory type
Parametric amplifiers
Passive repeaters
Phonograph needle cartridges
Phonograph needles
Piezoelectric crystals
Power supplies, static: regulated, unregulated, variable frequency
Printed circuits
Pulse forming networks
Quartz crystals, for electronic application
Recording and playback heads, magnetic
Recording heads, for speech and musical equipment
Rectifiers, electronic: except solid state
Relays, for electronic use
Resonant reed devices, electronic
Rheostats, for electronic end products
Sockets, electronic tube
Solenoids for electronic applications
Step positioners for transmitting equipment
Styli, phonograph record cutting
Switches, electronic applications
Switches, stepping
Tape, magnetic recording, including paper tape
Thick film circuits
Transducers, electrical
Tube retainers, electronic
Tube spacers, mica
Tube transformer assemblies used in firing electronic tubes
Video triggers, except remote control TV devices
Voice controls
Wave guides and fittings

3693 Radiographic X-ray, Fluoroscopic X-ray, Therapeutic X-ray, and Other X-ray Apparatus and Tubes; Electromedical and Electrotherapeutic Apparatus

Establishments primarily engaged in manufacturing radiographic X-ray, fluoroscopic X-ray, and therapeutic X-ray apparatus and tubes for medical, industrial, research and control applications. This industry also includes establishments primarily engaged in manufacturing electromedical and electrotherapeutic apparatus except electrotherapeutic lamp units for ultra-violet and infra-red radiation (Industry 3641). Establishments primarily engaged in manufacturing radio receiving type tubes are classified in Industry 3671; television receiving cathode ray tubes in Industry 3672; and transmitting tubes in Industry 3673.

Arc lamp units, electrotherapeutic: except infra-red and ultra-violet
Cardiographs
Electrocardiographs
Electroencephalographs
Electromedical apparatus
Electromyographs
Fluoroscopes
Fluoroscopic X-ray apparatus and tubes
Lamps, X-ray
Phonocardiographs
Radiographic X-ray apparatus and tubes: medical, industrial, and research
Radium equipment
Therapeutic X-ray apparatus and tubes: for medical, industrial, research
X-ray apparatus and tubes: for medical, industrial, research, and control
X-ray generators

Major Group 38.—MEASURING, ANALYZING, AND CONTROLLING INSTRUMENTS; PHOTOGRAPHIC, MEDICAL, AND OPTICAL GOODS; WATCHES AND CLOCKS

The Major Group as a Whole

This major group includes establishments engaged in manufacturing instruments (including professional and scientific) for measuring, testing, analyzing, and controlling, and their associated sensors and accessories; optical instruments and lenses; surveying and drafting instruments; surgical, medical, and dental instruments, equipment, and supplies; ophthalmic goods; photographic equipment and supplies; and watches and clocks.

Industry No.

ENGINEERING, LABORATORY, SCIENTIFIC, AND RESEARCH INSTRUMENTS AND ASSOCIATED EQUIPMENT

3811 Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment

Establishments primarily engaged in manufacturing engineering, laboratory, and scientific instruments, including nautical, navigational, aeronautical, surveying, and drafting equipment and instruments for laboratory work and scientific research (except optical instruments—Industry 3832). Establishments primarily engaged in manufacturing surgical and medical instruments are classified in Industry 3841; dental instruments and equipment in Industry 3843; measuring, analyzing, and controlling instruments, including instruments for measuring electrical quantities and characteristics, in Group 382; watches and clocks in Industry 3873; machinists' precision measuring tools in Industry 3545; and measuring and dispensing pumps in Industry 3586.

- Acceleration indicators and systems components, aerospace type
- Airspeed instrumentation (aeronautical instruments)
- Aircraft flight instruments
- Alidades (surveying instruments)
- Altimeters, standard and sensitive (aeronautical instruments)
- Angle-of-attack instrumentation
- Angle-of-yaw instrumentation
- Autoclaves, laboratory
- Automatic pilots, aircraft
- Bacteriological laboratory instruments: except medical, optical, and dental
- Balances, laboratory
- Bank and turn indicators and components (aeronautical instruments)
- Binnacles (compass housings)
- Blood testing apparatus
- Bunsen burners
- Calibration tapes, for physical testing machines
- Calorimeters
- Centrifuges, laboratory
- Chemical laboratory apparatus
- Clinical laboratory instruments, except medical and dental
- Coal testing apparatus
- Compasses and accessories, except portable (navigational instruments)
- Degaussing equipment
- Distilling apparatus, laboratory type
- Drafting instruments and machines: T-squares, templates, etc.
- Driftmeters, aeronautical
- Dust sampling and analysis equipment
- Environmental testing equipment
- Fathometers
- Furnaces, laboratory: except dental
- Gas analyzing equipment
- Generators, magnetic idealization
- Glide slope indicators
- Gyro gimbals
- Gyrocompasses
- Gyropilots
- Gyroscopes
- Haemoglobinometers
- Horizon flight indicators
- Hydrogen ion equipment, colorimetric
- Incubators, laboratory
- Integrators (mathematical instruments)
- Laboratory equipment: fume hoods, distillation racks, benches, cabinets
- Laboratory testing and scientific instruments, except electric
- Laser beam alinement devices
- Laser scientific and engineering instruments
- Machmeters
- Magnetic idealization generators
- Map plotting instruments
- Micromanipulator
- Microtomes
- Meteorological instruments: laboratory, except optical
- Nautical instruments
- Navigational instruments
- Omni-bearing indicators

3811 Engineering, Laboratory, Scientific, and Research Instruments and Associated Equipment—Continued

- Pellicle mirrors
- Petroleum product analyzing apparatus
- Photogrammetry equipment
- Photopitometers
- Physics laboratory apparatus and instruments
- Pi tapes (metal periphery direct reading diameter tapes)
- Pictorial deviation indicators
- Pipettes, hemocytometer
- Pitometers
- Planimeters
- Plotting instruments, drafting and map reading
- Plumb bobs
- Position indicators for landing gear, cowl flaps, stabilizers, etc.
- Pumps, vacuum: laboratory
- Radio magnetic instrumentation (RMI)
- Rate-of-climb instrumentation
- Seismographs
- Seismometers
- Seismoscopes
- Sewage testing apparatus
- Sextants
- Shadowgraphs
- Slide rules
- Standards and calibrating equipment, laboratory
- Surveying instruments and accessories
- Tables, work: laboratory
- Taffrail logs
- Theodolites (surveying equipment)
- Time interval measuring equipment, electric (laboratory type)
- Time measuring and counting equipment, electric (laboratory type)
- Transits, surveyors'
- Turntable indicator testers
- Water testing apparatus
- Work tables, laboratory

3823 Industrial Instruments for Measurement, Display, and Control of Process Variables; and Related Products

Establishments primarily engaged in manufacturing industrial instruments and related products for measuring, displaying (indicating and/or recording), transmitting, and controlling process variables in manufacturing, energy conversion, and public service utilities. These instruments operate mechanically, pneumatically, electronically, or electrically to measure process variables such as temperature, humidity, pressure, vacuum, combustion, flow, level, viscosity, density, acidity, alkalinity, specific gravity, gas and liquid concentration, sequence, time interval, mechanical motion, and rotation. Establishments primarily engaged in manufacturing electrical integrating meters are classified in Industry 3825; residential and commercial comfort controls in Industry 3822; all liquid-in-glass and bimetal thermometers and glass hydrometers in Industry 3829; recorder charts in Group 275, and optical instruments in Industry 3832.

- Absorption analyzers, industrial process type: infra-red, X-ray, etc.
- Analyzers, industrial process type
- Annunciators, relay and solid state types: industrial display
- Boiler controls: industrial, power, and marine type
- Buoyancy instruments, industrial process type
- Chromatographs, industrial process type
- Combustion control instruments, except commercial and household furnace type
- Computer interface equipment for industrial process control
- Controllers for process variables: electric, electronic, and pneumatic
- Coulometric analyzers, industrial process type
- Data loggers, industrial process type
- Density and specific gravity instruments, industrial process type
- Differential pressure instruments, industrial process type
- Digital displays of process variables
- Draft gauges, industrial process type
- Electrodes used in industrial process measurement
- Electrolytic conductivity instruments, industrial process type
- Flow instruments, industrial process type
- Fluidic devices, circuits, and systems for process control
- Gas and liquid analysis instruments, industrial process type
- Gas flow computers, industrial process type
- Humidity instruments, industrial process type
- Hydrometers, industrial process type
- Hygrometers, industrial process type
- Industrial process control instruments
- Infra-red instruments, industrial process type
- Level and bulk measuring instruments, industrial process type
- Liquid analysis instruments, industrial process type
- Liquid concentration instruments, industrial process type
- Liquid level instruments, industrial process type
- Magnetic flow meters, industrial process type
- Manometers, industrial process type
- Moisture meters, industrial process type
- Nuclear reactor controls
- Panelboard indicators, recorders and controllers: receiver type
- PH instruments, industrial process type
- Potentiometric self-balancing instruments, except X-Y plotters
- Pressure gauges, dial and digital
- Pressure instruments, industrial process type
- Primary elements for process flow measurement: orifice plates, etc.
- Programmers, process type
- Pyrometers, industrial process type
- Refractometers, industrial process type
- Resistance thermometers and bulbs, industrial process type
- Telemetering instruments, industrial process type
- Temperature instruments: industrial process type, except glass and bimetal
- Thermal conductivity instruments, industrial process type
- Thermistors, industrial process type
- Thermocouples, industrial process type
- Thermometers, filled system: industrial process type
- Time cycle and program controllers, industrial process type
- Transmitters of process variables, standard signal conversion
- Turbidity instruments, industrial process type
- Turbine flow meters, industrial process type
- Viscosimeters, industrial process type
- Water quality monitoring and control systems

3824 Totalizing Fluid Meters and Counting Devices

Establishments primarily engaged in manufacturing totalizing (registering) meters monitoring fluid flows, such as watermeters and gasmeters; and producers of mechanical and electromechanical counters and associated metering devices. Establishments primarily engaged in manufacturing electricity integrating meters and electronic frequency counters are classified in Industry 3825; and industrial process instruments in Industry 3823.

- Controls, revolution and timing instruments
- Counter type registers
- Counters: mechanical, electrical, electronic totalizing
- Counters, revolution
- Electromechanical counters
- Electronic totalizing counters
- Gasmeters; domestic, large capacity, industrial
- Gasoline dispensing meters (except pumps)
- Gauges for computing pressure-temperature corrections
- Impeller and counter driven flow meters
- Integrating meters, nonelectric
- Linear counters
- Magnetic counters
- Measuring wheels
- Meters: gas, liquid, tallying, and mechanical measuring—except electrical
- Odometers
- Parking meters
- Pedometers
- Positive displacement meters
- Predetermining counters
- Production counters
- Propeller type meters with registers
- Registers, linear tallying
- Rotary type meters, consumption registering
- Speed indicators and recorders, vehicle
- Speedometers
- Tachometer, centrifugal
- Tally counters
- Tallying meters: except electrical instruments, watches, clocks
- Tank truck meters
- Taximeters
- Totalizing meters, consumption registering, except aircraft
- Turbine meters, consumption registering
- Vehicle tank meters
- Watermeters, consumption registering

3825 Instruments for Measuring and Testing of Electricity and Electrical Signals

Establishments primarily engaged in manufacturing instruments for measuring the characteristics of electricity and electrical signals, such as voltmeters, ammeters, wattmeters, watt-hour meters, demand meters, and equipment for testing the electrical characteristics of electrical, radio, and communication circuits and of internal combustion engines. Establishments primarily engaged in the manufacturing of electronic checkout, monitoring, evaluating, and other electronic support equipment for electronic navigational, radar, sonar, and other communications systems are classified in Industry 3662.

- Alternator and generator testers
- Ammeters
- Ampere-hour meters
- Analog-to-digital converters, electronic instrumentation type
- Analyzers for testing electrical characteristics
- Audiometers
- Automotive ammeters and voltmeters
- Battery testers, electrical
- Bleed control cabinets (engine testers)
- Bridges: Kelvin, Wheatstone, vacuum tube, megohm, etc.
- Current measuring equipment
- Decade boxes: capacitance, inductance, and resistance
- Demand meters, electric
- Diode and transistor testers
- Digital panel meters, electricity measuring
- Digital test equipment, electronic and electrical circuits and equipment
- Digital-to-analog converters, electronic instrumentation type
- Distortion meters and analyzers
- Elapsed time meters, electronic
- Electrical power measuring equipment
- Electron tube test equipment
- Electronic test equipment for testing electrical characteristics
- Energy measuring equipment, electrical
- Field strength and intensity measuring equipment, electrical
- Frequency meters: electrical, mechanical, and electronic
- Frequency synthesizers
- Function generators
- Galvanometers
- Ignition testing instruments
- Impedance measuring equipment
- Indicating instruments, electric
- Instrument relays, all types
- Instrument shunts
- Instruments, electric: for testing electrical characteristics
- Instruments for measuring electrical quantities
- Integrated-circuit testers
- Integrating electricity meters
- Internal combustion engine analyzers, to test electrical characteristics
- Laboratory standards, electric: resistance, inductance, and capacitance
- Logic circuit testers
- Measuring equipment for electronic and electrical circuits and equipment
- Measuring instruments and meters, electric
- Meters, electric: pocket, portable, panelboard, and graphic recording
- Meters, power factor and phase angle
- Microwave test equipment
- Multimeters
- Network analyzers
- Ohmmeters
- Oscillators, audiofrequency and radiofrequency (instrument types)
- Oscillographs and oscilloscopes
- Potentiometric instruments; except industrial process type
- Power measuring equipment, electrical
- Pulse (signal) generators
- Radar testing instruments, electric
- Radio apparatus analyzers, for testing electrical characteristics
- Radio frequency measuring equipment
- Radio set analyzers, electrical
- Radio tube checkers, electrical
- Recorders, oscillographic
- Reflectometers, sliding shorts

3825 Instruments for Measuring and Testing of Electricity and Electrical Signals—Con.

- Resistance measuring equipment
- Semiconductor test equipment
- Signal generators and averagers
- Spark plug testing instruments, electric
- Spectrum analyzers
- Standard cells
- Standards and calibration equipment for electrical measuring, except laboratory
- Standing wave ratio measuring equipment
- Stroboscopes
- Sweep generators
- Sweep oscillators
- Synchroscopes
- Tachometer generators
- Test equipment for electronic and electrical circuits and equipment
- Test sets, ignition harness
- Time code generators
- Transducers for volts, amperes, watts, vars, frequency, and power factor
- Transformers, instrument: portable
- Tube testers
- Voltmeters
- Volt-ohm milliammeters
- Watt-hour and demand meters, combined
- Watt-hour and time switch meters, combined
- Watt-hour meters, electric
- Wattmeters
- Waveform measuring and/or analyzing equipment
- X-Y recorders (plotters) except computer peripheral equipment

3829 Measuring and Controlling Devices, Not Elsewhere Classified

Establishments primarily engaged in manufacturing measuring and controlling devices, not elsewhere classified, including testing instruments to determine the physical properties of materials, nuclear instruments, aircraft engine instruments, and liquid-in-glass and bimetal thermometers.

- Accelerometers, except aerospace type
- Barometers, mercury and aneroid types
- Cable testing machines
- Compasses, magnetic: portable type
- Count rate meters, nuclear radiation
- Chronometers, electronic
- Dynamometer instruments
- Electrogamma ray loggers
- Fare registers, for street cars, buses, etc.
- Fatigue testing machines, industrial: mechanical
- Fire detector systems, nonelectric
- Fuel densitometers, aircraft engine
- Fuel mixture indicators, aircraft engine
- Fuel system instruments, aircraft
- Fuel totalizers, aircraft engine
- Gauges except electric, motor vehicle: oil pressure, water temperature
- Gauging instruments, thickness: ultrasonic
- Geiger counters
- Hardness testing equipment
- Humidity instruments, except industrial process and air-conditioning type
- Hydrometers, except industrial process type
- Hygrometers, except industrial process type
- Instrumentation for reactor controls, auxiliary
- Ion chambers
- Kinematic test and measuring equipment
- Level gauges, radiation type
- Medical diagnostic systems, nuclear
- Moisture density meters, except industrial process type
- Nuclear instrument modules
- Nuclear radiation detection and monitoring instruments
- Personnel dosimetry devices
- Physical properties testing and inspection equipment
- Pressure and vacuum indicators, aircraft engine
- Pulse analyzers, nuclear monitoring
- Radiation measuring and detecting (radiac) equipment
- Salinity indicators, except industrial process type
- Sample changers, nuclear radiation
- Scalers, nuclear radiation
- Scintillation detectors
- Spectrometers, liquid scintillation and nuclear
- Stress, strain, and flaw detecting and measuring equipment
- Synchronizers, aircraft engine
- Temperature sensors, except industrial process and aircraft type
- Testers for checking hydraulic controls on aircraft
- Testing equipment: abrasion, shearing strength, tensile strength, torsion
- Thermocouples, except industrial process and aircraft type
- Thermomagnetic oxygen analyzer
- Thermometers, liquid-in-glass and bimetal type
- Thrust power indicators, aircraft engine
- Toll booths, automatic
- Transducers, pressure
- Turnstiles, equipped with counting mechanisms
- Ultrasonic testing equipment
- Vibration meters, analyzers, and calibrators
- Viscosimeters, except industrial process type
- Whole body counters, nuclear

OPTICAL INSTRUMENTS AND LENSES

3832 Optical Instruments and Lenses

Establishments primarily engaged in manufacturing instruments that measure an optical property; apparatus except photographic that projects or magnifies such as binoculars, prisms, and lenses; optical sighting and fire control equipment; and related analytical instruments. Establishments primarily engaged in manufacturing eyeglass lenses, frames, or fittings are classified in Industry 3851; separate computers in Industry 3573; and electronic tracking and fire control systems in Industry 3662.

OPTICAL INSTRUMENTS AND LENSES—Continued

3832 Optical Instruments and Lenses—Continued

Aiming circles (fire control equipment)
Antiaircraft directors, except electronic
Binoculars
Boards: plotting, spotting, and gun fire adjustment
Borescopes
Chromatographic equipment (laboratory type)
Chronoscopes
Cinetheodolites
Coddington magnifying instruments
Colorimeters (optical instruments)
Contour projectors
Correctors: percentage, wind, roll (sighting and fire control equipment)
Coulometric analyzers, except industrial process type
Dyna-lens
Electron paramagnetic spin type apparatus
Electrophoresis equipment
Fiber optical devices
Fuse setters (fire control equipment)
Glasses, field or opera
Gratings, diffraction
Gun sights, optical
Interferometers
Laboratory analysis instruments, optical
Lens coating
Lens grinding, except ophthalmic
Lens mounts
Lenses, optical: photographic, magnifying, projection, and instrument
Light sources, standard
Lupes magnifying instruments, optical
Magnifying instruments, optical
Metallographs
Meteorological instruments, optical
Microprobes, electron
Microprojectors
Microscopes, except corneal
Mirrors, optical
Nephelometers
Nuclear magnetic resonance type apparatus
Optical comparators
Optical elements and assemblies, except ophthalmic
Optical measuring instruments
Perimeters (optical instruments)
Periscopes
Ph meters
Photometers
Photomicrographic apparatus
Phototheodolites
Polariscopes
Polarizers
Prisms, optical
Reflectors, optical
Reflectoscopes
Refractometers, except industrial process type
Searchlight mirrors and reflectors
Sighting and fire control equipment, optical
Specific ion measuring instruments
Spectrographs
Spectrometers and spectroscopes, optical instruments
Spyglasses
Telescopes: elbow, panoramic, sighting, fire control, etc.
Telescopic sights
Titrometers
Triplet magnifying instruments, optical
Turbidometers

SURGICAL, MEDICAL, AND DENTAL INSTRUMENTS AND SUPPLIES

3841 Surgical and Medical Instruments and Apparatus

Establishments primarily engaged in manufacturing medical, surgical, ophthalmic, and veterinary instruments and apparatus. Establishments primarily engaged in manufacturing surgical and orthopedic appliances are classified in Industry 3842; and electrotherapeutic, electromedical, and X-ray apparatus in Industry 3693.

Anesthesia apparatus
Auriscopes
Biopsy instruments and equipment
Blood pressure apparatus
Blood transfusion equipment
Bone drills
Bone plates and screws
Bone rongeurs
Bronchoscopes
Cannulae
Catheters
Clamps, surgical
Corneal microscopes
Cystoscopes
Diagnostic apparatus, physicians'
Eye examining instruments and apparatus
Fixation appliances, internal
Forceps, surgical
Gastroscopes
Hemodialysis apparatus
Holders, surgical needle
Hypodermic needles and syringes
Inhalation therapy equipment
Inhalators, surgical and medical
Instruments and apparatus: medical, surgical, ophthalmic, and veterinary
IV transfusion apparatus
Knives, surgical
Metabolism apparatus
Muscle exercise apparatus, ophthalmic
Needle holders, surgical
Needles, suture
Operating tables
Ophthalmic instruments and apparatus
Ophthalmometers and ophthalmoscopes
Optometers
Otoscopes
Oxygen tents
Pelvimeters
Physiotherapy equipment, electrical
Probes, surgical
Retractors
Rifles for propelling hypodermics into animals
Retinoscopes
Saws, surgical
Skin grafting equipment
Slit lamps (ophthalmic goods)
Speculums
Sphygmomanometers
Stethoscopes and stethographs
Suction therapy apparatus
Surgical instruments and apparatus
Surgical knife blades and handles
Tonometers, medical
Trocars
Ultrasonic medical equipment
Veterinarians' instruments and apparatus

SURGICAL, MEDICAL, AND DENTAL INSTRUMENTS AND SUPPLIES—Con.

3842 Orthopedic, Prosthetic, and Surgical Appliances and Supplies

Establishments primarily engaged in manufacturing orthopedic, prosthetic, and surgical appliances and supplies, arch supports, and other foot appliances; fracture appliances, elastic hosiery, abdominal supporters, braces, and trusses; bandages; surgical gauze and dressings; sutures; adhesive tapes and medicated plasters; and personal safety appliances and equipment. Establishments primarily engaged in manufacturing surgical and medical instruments are classified in Industry 3841. Establishments primarily engaged in manufacturing appliances and in the personal fitting to the individual prescription of a physician are classified in trade industries.

Abdominal supporters, braces, and trusses
Absorbent cotton, sterilized
Adhesive tape and plasters, medicated or nonmedicated
Applicators, cotton tipped
Atomizers, medical
Autoclaves, hospital and surgical
Bandages and dressings, surgical and orthopedic
Bandages: plastic, muslin, plaster of paris, etc.
Belts: sanitary, surgical, and corrective
Braces, elastic
Braces, orthopedic
Bulletproof vests
Canes, orthopedic
Cervical collars
Clothing, fire resistant and protective
Colostomy appliances
Corn remover pads, bunion pads, etc.
Corsets, surgical
Cosmetic restorations
Cotton, absorbent: sterilized
Cotton, including cotton balls, sterile and nonsterile
Crutches and walkers
Drapes, surgical: cotton
Dressings, surgical
Ear stoppers
Elastic hosiery, orthopedic
Extension shoes, orthopedic
First aid, snake bite, and burn kits
Foot appliances, orthopedic
Fracture appliances, surgical
Gas masks
Gauze, surgical: not made in weaving mills
Grafts, artificial: for surgery—made of braided or mesh artificial fibers
Gynecological supplies and appliances
Hearing aids
Helmets, space
Hosiery, support
Hydrotherapy equipment
Infant incubators
Intra-uterine devices
Iron lungs
Life preservers, except cork and inflatable
Ligatures, medical
Limbs, artificial
Linemen's safety belts
Models, anatomical
Noise protectors, personal
Orthopedic devices and materials
Pads, incontinent and bed
Personal safety appliances and equipment
Plugs, ear and nose
Prosthetic appliances and supplies
Radiation shielding aprons, gloves, sheeting, etc.
Respirators
Respiratory protection equipment, personal
Restraints, patient
Safety appliances and equipment, personal
Safety gloves, all materials
Socks, stump
Space suits
Splints, pneumatic and wood
Sponges, surgical
Sterilizers, hospital and surgical
Stockinette, surgical
Stretchers
Suits, firefighting: asbestos
Supports: abdominal, ankle, arch, kneecap, etc.
Surgical appliances and supplies, except medical instruments
Suspensories
Sutures, absorbable and nonabsorbable
Swabs, sanitary cotton
Tongue depressors
Traction apparatus
Trusses: orthopedic and surgical
Welders' hoods
Wheelchairs
Whirlpool baths, hydrotherapy equipment

3843 Dental Equipment and Supplies

Establishments primarily engaged in manufacturing artificial teeth, dental metals, alloys and amalgams, and a wide variety of equipment, instruments, and supplies used by dentists, dental laboratories, and dental colleges. Dental laboratories constructing artificial dentures, bridges, inlays, and other dental restorations on specifications from dentists are classified in Industry 8072.

Abrasive points, wheels, and disks: dental
Autoclaves, dental
Broaches, dental
Burs, dental
Cabinets, dental
Cement, dental
Chairs, dentists'
Compounds, dental
Cutting instruments, dental
Dental alloys for amalgams
Dental engines
Dental equipment and supplies
Dental laboratory equipment
Dental metal
Denture materials
Drills, dental
Enamels, dentists'
Forceps, dental
Furnaces, laboratory: dental

3843 Dental Equipment and Supplies—Continued

Glue, dental
Gold, dental
Hand pieces and parts, dental
Impression material, dental
Investment material, dental
Orthodontic appliances
Plaster, dental
Pliers, dental
Sterilizers, dental
Teeth, artificial: not made in dental laboratories
Tools, dentists'
Ultrasonic dental equipment
Wax, dental

OPHTHALMIC GOODS

3851 Ophthalmic Goods

Establishments primarily engaged in manufacturing ophthalmic frames, lenses, and sunglass lenses. Establishments primarily engaged in manufacturing slit lamps are classified in Industry 3841, and molded glass blanks in Industry 3229. Establishments primarily engaged in grinding lenses and fitting glasses to prescription are classified in trade.

Contact lenses
Eyeglasses, lenses, and frames
Eyes, glass and plastic
Frames and parts, eyeglass and spectacle
Glasses, sun or glare
Goggles: sun, safety, industrial, underwater, etc.
Lens grinding, ophthalmic
Lenses, ophthalmic
Lorgnettes
Magnifiers (readers and simple magnifiers)
Mountings, eyeglass and spectacle
Optical grinding service for the trade
Protectors, eye
Spectacles
Temples and fronts, ophthalmic

PHOTOGRAPHIC EQUIPMENT AND SUPPLIES

3861 Photographic Equipment and Supplies

Establishments primarily engaged in manufacturing (1) photographic apparatus, equipment, parts, attachments, and accessories, such as still and motion picture cameras and projection apparatus; photocopy and microfilm equipment; blueprinting and diazotype (white printing) apparatus and equipment; and other photographic equipment; and (2) sensitized film, paper, cloth, and plates, and prepared photographic chemicals for use therewith. Establishments primarily engaged in manufacturing photographic paper stock (unsensitized), and paper mats, mounts, easels, and folders for photographic use are classified in Major Group 26; photographic lenses in Industry 3832; photographic glass in Major Group 32; chemicals for technical purposes, not specifically prepared and packaged for use in photography, in Major Group 28; and photographic flash, flood enlarger, and projection lamps in Industry 3641.

Aerial cameras
Blueprint cloth or paper, sensitized
Blueprint reproduction machines and equipment
Brownprint paper and cloth, sensitized
Brownprint reproduction machines and equipment
Cabinets, cassette film transfer
Cameras, microfilm
Cameras, still and motion picture: all types
Densitometers
Developers, prepared photographic: not made in chemical plants
Developing machines and equipment, still or motion picture
Diazo (whiteprint) paper and cloth, sensitized
Diazotype (whiteprint) reproduction machines and equipment
Driers, photographic
Editing equipment, motion picture: rewinds, viewers, titlers, splicers
Enlargers, photographic
Exposure meters, photographic
Film, sensitized: motion picture, X-ray, still camera, and special purpose
Fixers, prepared photographic: not made in chemical plants
Flashlight apparatus for photographers, except bulbs
Graphic arts plates, sensitized
Hangers: photographic film, plate, and paper
Heat sensitized paper made from purchased paper
Holders: photographic film, plate, and paper
Lantern slide plates, sensitized
Lens shades, camera
Light meters, photographic
Metallic emulsion sensitized paper and cloth, photographic
Microfilm equipment: cameras, projectors, readers, etc.
Motion picture apparatus and equipment
Motion picture film
Photo reconnaissance systems
Photo equipment, all types
Photocopy machines
Photoflash equipment, except lamps
Photographic chemicals, prepared: not made in chemical plants

3861 Photographic Equipment and Supplies—Continued

Photographic equipment and accessories
Photographic instruments, electronic
Photographic paper and cloth, sensitized: all types
Photographic sensitized goods
Plates, photographic: sensitized
Printing equipment, photographic
Printing frames, photographic
Processing equipment, photographic
Projectors, still and motion picture: silent and sound
Range finders, photographic
Reels, film
Screens, projection
Sensitometers, photographic
Shutters, camera
Sound recording and reproducing equipment, motion picture
Stands, camera and projector
Stereopticons
Tanks: photographic developing, fixing, and washing
Toners, prepared photographic: not made in chemical plants
Trays, photographic printing and processing
Tripods, camera and projector
Washers, photographic print and film
X-ray film
X-ray plates, sensitized

APPENDIX 7
HIGH TECHNOLOGY FIRMS LOCATED IN THE SACRAMENTO REGION

COMPANY	AREA	PRODUCT	SIC	NO. EMPLOYEED CURRENT	NO. EMPLOYEES HORIZON
Hewlett-Packard 123 West Placer Blvd. Roseville, CA 95678	Roseville	Electronic Instruments	3573	600	5000-5500
Shugart Associates 90 North Sunrise Ave. Roseville, CA 95678	Roseville	Electronic Components	3573	300	2500
System Integrators, Inc. 1820 Tribute Rd. Sacramento, CA 95815	Woodlake-Arden	Computer Systems for Newspapers	3573	190	—
Computer Hardware, Inc. 4111 North Freeway Blvd. Sacramento, CA 95834	Northgate-Norwood	Computers	3573	100	—
Digital Engineering, Inc. 1775-C Tribute Rd. Sacramento, CA 95815	Woodlake-Arden	Specialized Computer Components	3573	31	—
Signetics 4130 South Market Ct. Sacramento, CA	Northgate-Norwood	Computer-Military Products Testing and Distribution	3573	400	600
Franklin Electric Co. Prospect Business Park Rancho Cordova, CA 95670	Sunrise	Voltage Regulators for Computers	3612	—	350
ESS, Inc. 9613 Oates Dr. Sacramento, CA 95827	Bradshaw	Hi-Fi Speakers Components	3651		—
AB Systems Design, Inc. 9477 Greenback Ln. Folsom, CA 95610	Non-Industrial	Commercial Power Amplifiers	3651	40	150
Koropp Speaker Co. 2539 Tesla Way Sacramento, CA 95825	Non-Industrial	Speaker Components	3651	4	—
Threshold Corp. 1832 Tribute Rd. Sacramento, CA 95815	Woodlake-Arden	Hi-Fi Amps and Pre-Amps	3651	26	26
Aerojet Services Co. P.O. Box 13618 Sacramento, CA 95813	Aerojet General	Support Services for Aerospace and Marine Systems	3662	270	—
Audiolab Electronic, Inc. 3725 Esperanza Dr. Sacramento, CA 95825	Non-Industrial	Radio Components	3662	9	—
Broadcast Audio Assoc. 11355 Pyrites Way Rancho Cordova, CA 95670	Sunrise	Audio Components for Radio and T.V. Stations	3662	7	—
Cetec Corporation 6939 Power Inn Rd. Sacramento, CA 95828	Florin-Perkins	Antennas	3662	45	—
Control Systems 1908 P Street Sacramento, CA 95814		Audio Components	3662	2	—
Acoustic Emission Technology 1828-A Tribute Rd. Sacramento, CA 95815	Woodlake-Arden	Mfg. Precision Measurement Instruments	3662	29	—
Jampro Antenna Co. 6939 Power Inn Rd. Sacramento, CA 95828	Florin-Perkins	T.V. and F.M. Broadcasting Antennas, Electronics	3662	35	—
Life Dynamics Corp. 2317 Lexington St. Sacramento, CA 95813	Woodlake-Arden	Mfg. Electronic Components	3662	5	—
Skutch Electronics 3751 Dell Rd. Roseville, CA 95678	Roseville	Electronic Components	3662	3	—
Nippon Electric Co. (NEC) Electronic Arrays Division	Roseville	Large Scale Integrated Circuits	3670	—	575 (1200 by 1987)
American Cable Electronic Supply 5485 Hemlock St. Sacramento, CA 95841	Non-Industrial	Electronic Cable Wiring	3679	8	—
General Electric Co. Medical Systems Division 11505 Douglas Road Rancho Cordova, CA 95670	McDonald-Douglas	Fabricate and Design Electronic Equipment	3679	160	320
Product Enterprises, Inc. 1805-D Tribute Rd. Sacramento, CA 95815	Woodlake-Arden	Consumer Electronics	3679	3-60	—
Stereo Simulcast 68 Lochmoor Circle Sacramento, CA 95823	Non-Industrial	Fire Station Time Logs	3679	3	—
Teletek Enterprises, Inc. 9767-F Business Park Dr. Sacramento, CA 95827	Bradshaw	Computer Board Design	3679	7	—
Western Instruments Scientific 816 Olive Drive Davis, CA 95616	Davis	Precision Instruments	3679	4	—
Zinsco Electrical Products 2950 Ramona Ave. Sacramento, CA 95826	Florin-Perkins	Electrical Products	3679	15	—

COMPANY	AREA	PRODUCT	SIC	NO. EMPLOYEED CURRENT	NO. EMPLOYEES HORIZON
K.V.P. Company 6199 Warehouse Way Sacramento, CA 95826	Florin-Perkins	Thermoplastic Chain and Component Parts	3811	15	—
Virotrol Corp. 11363 Folsom Blvd. Rancho Cordova, CA 95670	Sunrise	Environmental Controls Systems	3811	10	—
Weather Measure Corp. 3213 Orange Grove Ave. North Highlands, CA 95660	Roseville Road	Weather Instruments	3811	45	100
Wemco Measure Corp. 1796 Tribute Rd. Sacramento, CA 95813	Woodlake-Arden	Pumping Equipment Sewage/Waste-water	3823	225	—
Cooper, C.A. Company 1641 F Juliesse Ave. Sacramento, CA 95815	Non-Industrial	Precision Instruments	3829	2	—
Ramko Research, Inc. 11355-A Folsom Blvd. Rancho Cordova, CA 95670	Sunrise	Precision Instruments	3829	44	90
Second Foundation 10993 Sun Center Dr. Rancho Cordova, CA 95670	Sunrise	Scanner Sonic/Medical Instruments	3841	75	300
Silicon Casting, Inc. 2616 Mercantile Dr. Rancho Cordova, CA	Sunrise	Mfg. Optical Equipment	3832	16	—
TOTAL				2793	8321-9446*

*Increase above present employees

APPENDIX A-8
EVALUATION OF INDUSTRIAL LAND SUITABILITY FOR HIGH-TECHNOLOGY MANUFACTURING

	SUNRISE	NORTHGATE	BRADSHAW	FLORIN-PERKINS	FOLSOM	ANTELOPE	McD.-DOUGLAS
Total Vacant Land	1,420 ac.	700 ac.	465 ac.	1,660 ac.	680 ac.	320 ac.	3,750 ac.
Suitable Vacant Land	600 ac.	670 ac.	320 ac.	585 ac.	410 ac.	150 ac.	3,750 ac.
with improvements	280 ac.	190 ac.	50 ac.	40 ac.	18 ac.	—	—
parcel sizes	1-6 acres	3-28 acres	1-6 acres	2-20 acres	1-3 acres	—	—
w/o improvements	400 ac.	480 ac.	270 ac.	545 ac.	392 ac.	150 ac.	3,752 ac.
parcel sizes	1-60 acres	2-160 acres	1-100 acres	5-40 acres	15-150 acre	5-95 acres	15-3,530 acres
Land Absorbed							
1980	87 ac.	50 ac.	22 ac.	47 ac.	16 ac.	—	n/a
1979	33 ac.	31 ac.	15 ac.	44 ac.	3 ac.	—	n/a
Construction							
1980	1.4 msf.	0.6 msf.	0.4 msf.	0.6 msf.	—	—	—
1979	0.3 msf.	0.4 msf.	0.2 msf.	0.8 msf.	—	—	—
Land Prices	$1.50-3.00/sf	$1.25-3.00/sf	$1.50-4.00/sf	$1.00-2.00/sf	$2.40-4.80/sf.	n/a	n/a
Building Lease Rates							
Office	$ .55- .60/sf	$ .40- .60/sf	$ .50- .80/sf	n/a	n/a	n/a	n/a
Warehouse	$ .14- .30/sf	$ .14- .22/sf	$ .14- .30/sf	$ .14- .18/sf	n/a	n/a	n/a
Typical Land Use in industrial area	Construction Contractors Whse./Distn. Auto Wrecking	Whse./Distn. Light Mfg. Offices	Whse./Distn. Showroom Rtl. Light Mfg.	Hvy. & Lt. Whse and Distr. Heavy and Light Mfg.	Construction Contractors	Railroad yards Auto Wrecking	Light Manufacturing
Land Use Conflicts Existing and Potential	Outside Storage Auto Wrecking Aggregate Mining Mobilehome Park	Agriculture, Meadows Res. Subdivision Residential near Norwood Tech BP	Retail users Residential for Old Placerville sites, Mobile-home Park	Heavy mfg. and Whse. image No landscaping	Natoma Station & Folsom Exec Estates res. subdivisions	Railroad operations Residential neighbors	Agriculture Adj. Aerojet testing
Infrastructure Problems	Where unserved, services have been arranged	Where unserved, arrangements made	Possible drainage problems on 76-acre quarry site	Where unserved, arrangements made	Prairie City Area currently unserved	Not anticipated	Service Agreements being made
Freeway Access	Within 2 miles for all suitable sites	Within 2 miles for all suitable sites	Within 2 miles for all suitable sites	From 3 - 4 miles for all sites	Within 2 miles for all sites	Within 2 miles for all suitable sites	From 2 to 6 miles for all sites
Proximity to med. cost housing	Much within 1 to 5 miles	Much within 1 to 4 miles	Much within 1 to 5 miles	Much within 2 to 6 miles	Much within 4 to 8 miles	Much within 1 to 5 miles	Much within 4 to 8 miles
Major Owners	Oates, RJB, McCuen & Steele, Natomas Co., Lukenbill	RJB, Oates, Butler, Banchero/ Hathaway	Oates, Fite, RJB, Cook, Butler	Oates, FPEC Inv. Affinato	ESS, Samark, Natomas Co., Folsom Exec. Estates	Southern Pacific	McDonnell-Douglas
Overall Rating	Fair to Excellent	Good to Excellent	Good to Excellent	Fair	Good	Good	Fair to Good

APPENDIX A-8 (Cont.)
EVALUATION OF INDUSTRIAL LAND SUITABILITY FOR HIGH-TECHNOLOGY MANUFACTURING

	WOODLAKE	SOUTH FLORIN	RICHARDS BLVD.	EL CAMINO	ROSEVILLE RD.	ELK GROVE	WEST McCLELLAN
Total Vacant Land	158 ac.	258 ac.	103 ac.	1105ac.	136 ac.	648 ac.	523 ac.
Suitable Vacant Land	68 ac.	81 ac.	41 ac.	51 ac.	87 ac.	176 ac.	260-500 ac.
with improvements	16 ac	38 ac.	41 ac.	—	—	32 ac.	—
parcel sizes	2 to 3 acres	5 - 14 acres	2 - 13 acres	—	—	1 - 3 acres	—
w/o improvements	52 ac.	43 ac.	—	51 ac.	87 ac.	144 ac.	260 - 300 ac.
parcel sizes	4 to 20 acres	4 - 23 acres	—	1 - 17 acres	(Air Force land)	2 - 5 acres	1 - 70 ac.
Land Absorbed							
1980	2 ac.	15 ac.	5 ac.	—	—	5 ac.	—
1979	12 ac.	9 ac.	9 ac.	3 ac.	—	23 ac.	—
Construction							
1980	0.1 msf.	0.2 msf.	—	—	—	—	—
1979	0.1 msf.	0.1 msf.	0.3 msf.	—	—	—	—
Land Prices	$1.50-3.00 sf	n/a	$1.75-3.50/ac.	$1,00-2.00/ac.	Depends on Redev. Project	$1.00-2.00/ac.	n/a
Building Lease Rates							
Office	n/a	n/a	n/a	n/a	$ .50- .66/sf	n/a	—
Warehouse	n/a	n/a	n/a	n/a	$ .15- .30/sf	n/a	—
Typical Land Use in industrial area	Whse./Distn.	Heavy mfg. and whse., trucking	Hvy. mfg., whse, railroad yds, trucking, motels, restaurants	Whse., light manufacturing	Whse./Distn. Lt. Manufacturing	Hvy. Mfg., Whsng, trucking	Vacant Residential
Land Use Conflicts Existing and Potential	Woodlake Inn Motel	Hvy. mfg., Residential	Sites adj. to hvy. mfg., whsng.	Sites adj. to Residential and eyesore Indust.	Eyesore ind. and porno trade	Residential, Hvy mfg. image	McClellan AFB, eyesore residential
Infrastructure Problems	Not anticipated, access to Hwy 160 not ideal	Streets	Street improvements	Streets, railroad grade crossing	Not anticipated	Street Improvements	Street, drainage, sewers
Freeway Access	Within 1 mile for all sites	Within 2 to 3 miles for all sites	Within 1 mile for all sites	Within 1 mile for all sites	Within 2 miles for all sites	Within 1 mile for all sites	Within 2 miles for all sites
Proximity to mod. cost housing	Much within 2 to 6 miles	Within 2 to 6 miles for all sites	Within 1 to 5 miles for all sites	Within 1 to 5 miles for all sites	Within 1 to 5 miles for all sites	Within 2 to 6 miles for all sites	Within 2 to 6 miles for all sites
Major Owners	North Sac. Land Company	Oates, SMF	So. Pacific, Cont. Can, River Park Assoc., Richards	Northgate Partnership	U.S.A.	So. Pacific, ZVS	Garrette, Others
Overall Rating	Good	Fair	Fair	Fair	Fair	Fair	Fair

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